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HAZARDOUS WASTE SURVIVAL GUIDE

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A Small & Medium Business Resource for Hazardous Waste Management & Reduction

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This document is a joint project of :

County of Santa Clara
Pollution Prevention Program

&

Santa Clara Valley
Nonpoint Source
Pollution Control Program

under the direction of the **Santa Clara County Hazardous Materials Advisory Committee**, a countywide coalition of government, industry, and public interest organizations dedicated to the promotion of hazardous materials and waste management policies that protect and enhance both the environmental and economic resources of our community.

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It is a significant expansion and revision of the document entitled *Hazardous Waste Management & Reduction: A Guide for Small & Medium-sized Businesses*, published in 1989 as a joint project of the City of San Jose and Santa Clara County.

DISCLAIMER

This publication is advisory only. It is intended to aid small and medium-sized businesses in identifying regulatory responsibilities and opportunities for hazardous waste reduction. It does not provide a comprehensive listing of either regulatory requirements or hazardous waste reduction techniques, and does not give specific legal advice. Compliance with environmental or occupational safety and health laws is the responsibility of each individual business. Contact the appropriate agencies for more detailed information about regulatory requirements.

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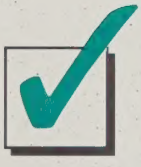
HAZARDOUS WASTE SURVIVAL GUIDE

A Small & Medium Business Resource For Hazardous Waste Management & Reduction

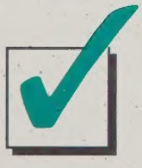


Environmental Compliance

Who regulates you? Why? What are the requirements?
Use the information provided to help identify compliance needs.

Waste Minimization

Complement compliance with waste minimization.
Step-by-step assessment & specific waste reduction suggestions.



Assistance & Information

Finding equipment & services. Financial assistance programs.
Tips on choosing reliable services. And much more!

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Please send any corrections or updated information to:

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FOREWORD

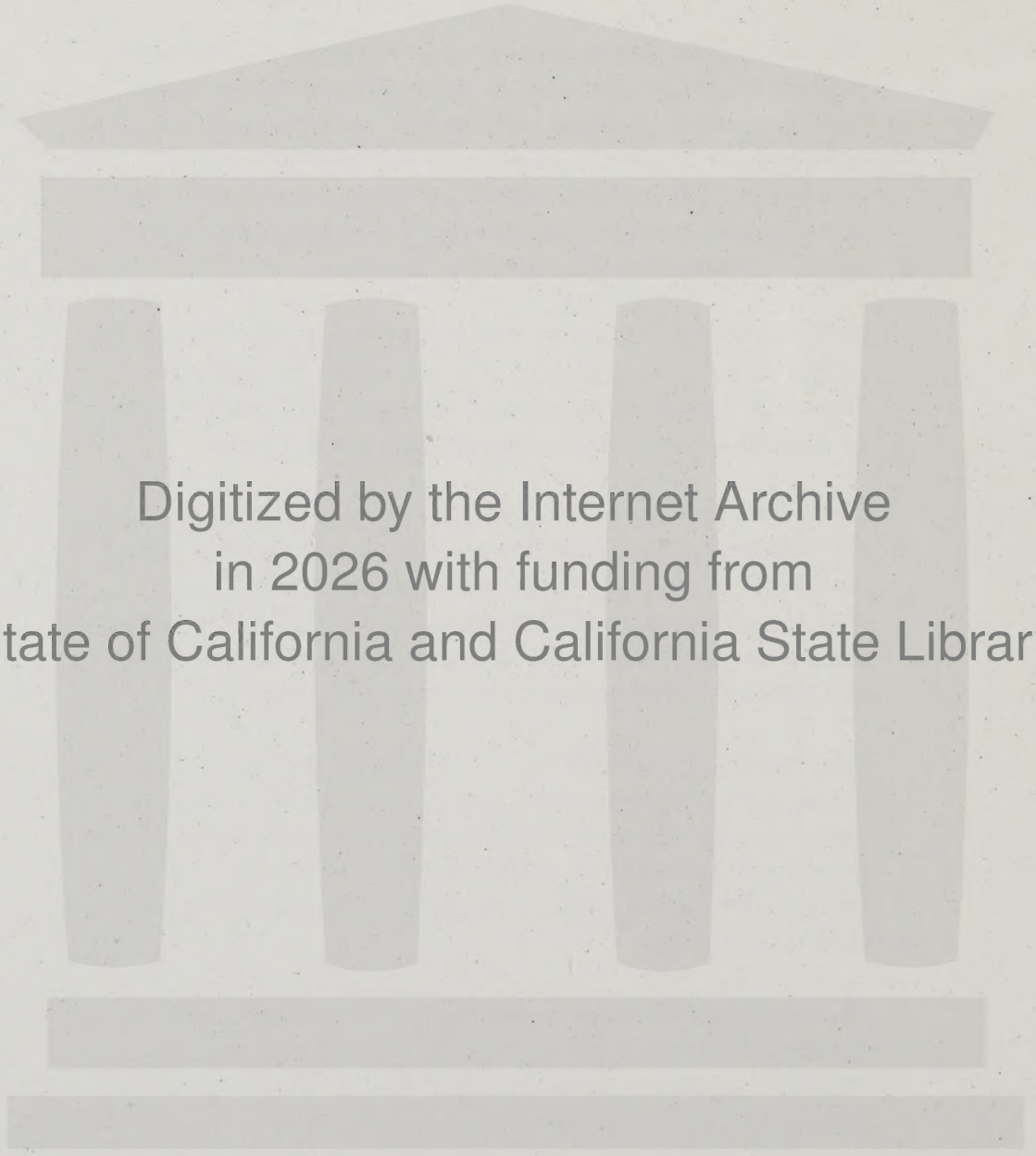
The 1990's hold complex challenges for the business community in Santa Clara County. Clearly, protection and enhancement of the environment remains a top priority for most communities, and businesses are required to comply with strict environmental regulations. The economic viability of many small firms is impacted as costs and liabilities associated with hazardous materials and waste management continually increase.

To remain competitive in the 1990's and beyond requires a fundamental shift in approach, from post-generation treatment and disposal to "pollution prevention" strategies which maximize production efficiency and minimize waste generation.

Many companies throughout the United States have already taken the initiative to adopt pollution prevention as an integral part of their business strategy. They have found that the best way to control expenses and liabilities associated with hazardous waste management is to reduce or eliminate reliance on the processes and raw materials that create them in the first place.

Your business can benefit too . . . Effectively integrating pollution prevention strategies into daily operations makes good business sense – reducing waste management costs, liabilities, and regulatory requirements. It also increases community confidence that local business is making every effort to handle hazardous wastes responsibly.

This guide was developed in response to the challenges faced by businesses in Santa Clara County. It is intended to help you improve competitiveness and profitability while at the same time keeping both workplace and the community clean.



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CHAPTER

Who, Why, & What of Waste Minimization 1

Case Study: Photo Lab

Custom Color Laboratory, a Palo Alto photoprocessor, has significantly reduced hazardous waste and washwater generation by material substitution and process equipment changes:

A few years ago the lab installed a water recycling system for secondary wash water. After ion-exchange columns remove the silver content, water is returned to the wash process. The system recycles 40,000–60,000 gals./month, and although it cost approximately $45,000, it paid for itself in four years through savings on water, gas, and sewage bills.

A recent materials switch to chemistry and paper containing less silver halide reduces silver effluent and requires 33–77% less replenisher. The new chemistry system is also 3 times faster, reduces washwater use by 300%, and triples potential productivity. Though required equipment changes cost approximately $55,000, these savings paid for the new equipment in about one year. Quality has improved too – with better color fidelity!

In addition, a regenerative bleach fix currently being tested would allow their processors to operate almost entirely as closed-loop systems. The system appears to be successful in full-scale production, reducing replenisher use to approximately 93% less than the original system.

Because Custom Color reduced silver-bearing chemistry discharges to less than 150 gals./month, one of the biggest advantages of their efforts was avoidance of regulation under original Permit-by-Rule (PBR).

Reduced costs, permits, and environmental impact – Increased production capacity and quality: . . .

. . . Good work Custom Color!

For more information call
Santa Clara County Pollution Prevention Program
(408) 441-1195

Introduction

This guidebook can be an effective tool to help you initiate, improve, and/or maintain a comprehensive waste management and reduction program. Included are a regulatory overview, step-by-step guidance on waste minimization, "success stories" in the beginning of each chapter, appendices offering helpful tips and additional sources of assistance, and directories to equipment and service providers. Use the Table of Contents to direct you to the topics of interest and importance to your firm.

This chapter will help you answer the following questions:

- ***WHO** DOES THIS GUIDE APPLY TO?* Do you know if your business generates hazardous waste? Use the included checklists to help you find out.
- ***WHY** SHOULD I PRACTICE WASTE MINIMIZATION?* Discover the benefits of and legal incentives for waste minimization.
- ***WHAT** EXACTLY IS EASTE MINIMIZATION?* Learn about key waste management concepts and typical waste minimization opportunities.

Who Does This Guide Apply To?

Any business which generates hazardous waste should implement waste minimization practices as part of a cost-effective compliance strategy. If you are not sure whether your business generates hazardous waste, read the rest of this section to help you make a determination. If you already *know* your business generates hazardous waste, skip the rest of this section and go on to "Why Do Waste Minimization?"

What is "Hazardous Waste?"

A ***hazardous waste*** is any discarded material that may pose a substantial threat or potential hazard to human health or the environment. A waste is considered hazardous if it is (as defined in CCR, Title 22, Division 4):

- *IGNITABLE* • *CORROSIVE* • *REACTIVE* • *TOXIC*

Under California law there are no exemptions for small quantities. Businesses producing any amount of hazardous waste are subject to the hazardous waste generator laws and requirements.

While it would be impossible to list all of the activities that generate hazardous waste, the following checklists can give you an idea whether or not your business generates hazardous waste:

Do You Use These Materials? ☞

Does your business use any of the following materials?

- ❑ oils or other petroleum products
- ❑ dyes, paints, printing inks, thinner solvents, or cleaning fluids
- ❑ pesticides or other related chemicals
- ❑ acids or bases which can dissolve metals, wood, paper, or clothing
- ❑ flammable materials
- ❑ products accompanied by a Material Safety Data Sheet or a label indicating that the product is hazardous
- ❑ photographic solutions

Are You Involved with One of These Industry Processes? ☞

Is your business within one of the following categories?

- ❑ Aerospace Industry/ Subcontractor
- ❑ Building Cleaning/Maintenance
- ❑ Chemical Formulation/ Distribution
- ❑ Construction Trades
- ❑ Dry Cleaning
- ❑ Educational/Vocational Shop
- ❑ Electronics Manufacturing
- ❑ Furniture Manufacturing/ Refinishing
- ❑ Laboratory
- ❑ Machine Shop
- ❑ Mechanical Equipment Repair
- ❑ Metal Fabrication
- ❑ Metal Finishing/Plating
- ❑ Painting/Stripping
- ❑ Paint Formulation
- ❑ Parts Cleaning
- ❑ Pesticide Applicators
- ❑ Photo-/X-ray Processing
- ❑ Printed Circuit Board Manufacturing
- ❑ Printing/Allied Industries
- ❑ Semiconductor Manufacturing
- ❑ Vehicle Maintenance/Repair
- ❑ Wood Preserving

If you have checked any of the boxes above, chances are your business generates hazardous waste. If you did not check any boxes, but still think you may generate a hazardous waste, call the Santa Clara County Hazardous Materials Compliance Division or the Cal/EPA Department of Toxic Substances Control waste classification number for assistance (refer to the directory in Chapter 2.).

Other "Wastes"

Wastewater discharges to the sewage treatment plant and air emissions are also regulated. You should consider releases to all media (land, air, water) when you determine regulatory responsibilities and plan waste reduction efforts.

Why Should I Practice Waste Minimization?

Waste minimization is a *cost-effective* business and compliance strategy that can reduce short- and long-term costs, minimize regulatory burdens, increase safety and/or productivity, and improve your company image. It is important to remember that there are also legal requirements for hazardous waste reduction, and that it should be an integral part of your environmental compliance efforts. Read on . . .

Benefits to Your Business

Reducing your business's hazardous materials use and waste generation has many potential benefits:

- **Reduce or Eliminate Expenses** – Many expenses associated with the use of hazardous materials and hazardous waste generation can decrease after implementing waste reduction:
  - hazardous waste fees/taxes
  - hazmat and hazardous waste generator permit fees
  - off-site waste transportation, treatment, and disposal costs
  - on-site materials/waste handling, treatment, and equipment costs
  - emergency and spill response planning and equipment costs
  - accident/worker exposure costs and compensation insurance premiums
  - potential site cleanup costs and pollution liability insurance premiums
  - raw materials/feedstock costs
- **Reduce Regulatory Requirements** – Reducing the amount of hazardous waste generated may reduce regulatory paperwork and requirements applicable to your business.
- **Improve Workplace Safety & Health** – The same actions you take to minimize hazardous waste generation should also increase workplace safety and reduce employee injury or illness.
- **Improve Employee Relations** – The increase in attention to health and safety and employee communications resulting from a waste minimization program can improve your overall employee relations.
- **Improve Public Image** –Your efforts to protect the local environment may result in an improved public image and potential marketing advantages.

$AVE

Costs for waste management are reduced because less waste needs to be managed.

LESS REGS

An auto shop which went to "zero discharge" no longer needs a wastewater permit (see page 3-1).

GOOD PR

Waste minimization can gain you a distinct advantage in today's environmentally conscious marketplace.

Legal Incentives and Requirements

Several regulatory requirements provide either legal incentives for or mandate implementation of hazardous waste minimization programs:

- All generators who ship hazardous waste to off-site facilities for recycling, treatment, storage, or disposal must certify on the waste manifest that a waste reduction program is in place.
- The Biennial Hazardous Waste Generator's report (see Chapter 2, page 4) includes a summary of waste minimization activity during the subject period.
- Companies that routinely generate more than 13 tons of hazardous waste (or 26 lbs. of extremely hazardous waste) per year must comply with "source reduction" planning requirements (see Chapter 2, page 4).
- Local wastewater treatment plants discharging to south San Francisco Bay have lowered allowable industrial discharge limits and routinely require waste minimization plans from businesses whose processes contribute wastewater discharges.
- State and federal regulations banning land disposal of untreated hazardous waste are powerful incentives for reducing hazardous waste generation.

Because environmental regulations and related costs are so pervasive in today's business climate, it is essential that cost-effective compliance be practiced by the regulated community.
Waste reduction is just that.

Tom Coss, President
Santa Clara Plating Co., Inc.

Recycling vs. Treatment

Treatment of hazardous waste requires a permit from the Cal/EPA Department of Toxic Substances Control (DTSC). However, treatment processes which are part of onsite recycling activities may qualify for permit exemptions. For more information, call the Santa Clara County Hazardous Materials Compliance Division to receive a copy of "Excerpts from California's Hazardous Waste Recycling Laws" and/or to speak with a duty officer.

About "Pollution Liability"

Businesses can be held financially liable for human exposures or site contamination caused by their hazardous materials or wastes, even once the waste has been sent for "proper" disposal. Reduced use of hazardous materials and hazardous waste generation reduces the amount of risk and potential liability. Generally, less risk is associated with recycling than treatment because less material is ultimately "disposed." Whether on-site or off-site methods have greater risk, however, is not clear. Off-site methods involve the risks of transportation, but commercial facilities may be able to operate more efficiently and safely than smaller on-site facilities. The answer will vary. Use your judgment, reduce your wastes as much as possible, and then choose equipment and/or services carefully (Appendix F can help you.).

What Exactly *Is* Waste Minimization?

Businesses can take a number of approaches to managing the hazardous waste they generate. In Figure 1, these approaches are arranged in a hierarchy, according to their potential for negatively impacting safety and the environment. The methods towards the top of the hierarchy are preferred as they reduce the amount of hazardous materials that eventually become waste, and therefore reduce present and future threats to human health and the environment.

The preferred approaches are collectively referred to as ***waste minimization****. Waste minimization means the reduction, to the extent feasible, of hazardous waste that is generated and subsequently treated, stored, or disposed. Waste minimization includes any **source reduction** or **recycling** activities, which are defined further:

- **Source Reduction:** Any actions which reduce the amount of waste initially generated, or which reduce the hazardous properties of wastes prior to their generation. Source reduction techniques, such as good "housekeeping" (e.g. first-in/first-out inventory control, improved cleanup methods, etc.) are often the simplest and least costly ways to reduce the amount of waste generated.

- **Recycling:** The reuse, or reclamation of waste after it has been generated, including (1) direct reuse as a raw material, (2) processing to eliminate impurities or regenerate for reuse, and (3) recovery of useful components. (In addition to reducing the amount of waste which must be disposed of, recycling also reduces the amount of virgin feedstock that must be produced and/or purchased.)

Treatment, which is not considered a waste minimization approach, includes actions which reduce the volume and/or hazardous properties of waste after its generation and prior to disposal or discharge ("end-of-pipe" actions). Many treatment techniques, however, are integrated into recycling processes to render materials reusable.

Unlike many waste treatment approaches, waste minimization can be practiced at several stages in most industrial processes. Like all creative solutions to waste management problems, waste minimization requires careful planning, creative problem solving, changes in attitude, sometimes capital investment, and, most important, a commitment. The payoffs for this commitment, however, can be great. And in some cases, such as improved housekeeping practices, payoffs can be realized almost immediately with little or no cost.

Various waste minimization and treatment options available are highlighted in Table 1.

*The terms *pollution prevention* and *waste reduction* are often used interchangeably with *waste minimization*, however they may imply slight differences in meaning: While *waste minimization* does not include treatment within its scope, *waste reduction* often does. The term *pollution prevention* emphasizes "multi-media" reduction of all wastes, including emissions and discharges to air and water. In this document, all terms – *waste minimization*, *waste reduction*, and *pollution prevention* – will exclude "treatment" and refer to the multi-media reduction of all emissions, discharges, and wastes requiring disposal.

FIGURE 1. HAZARDOUS WASTE MANAGEMENT HIERARCHY

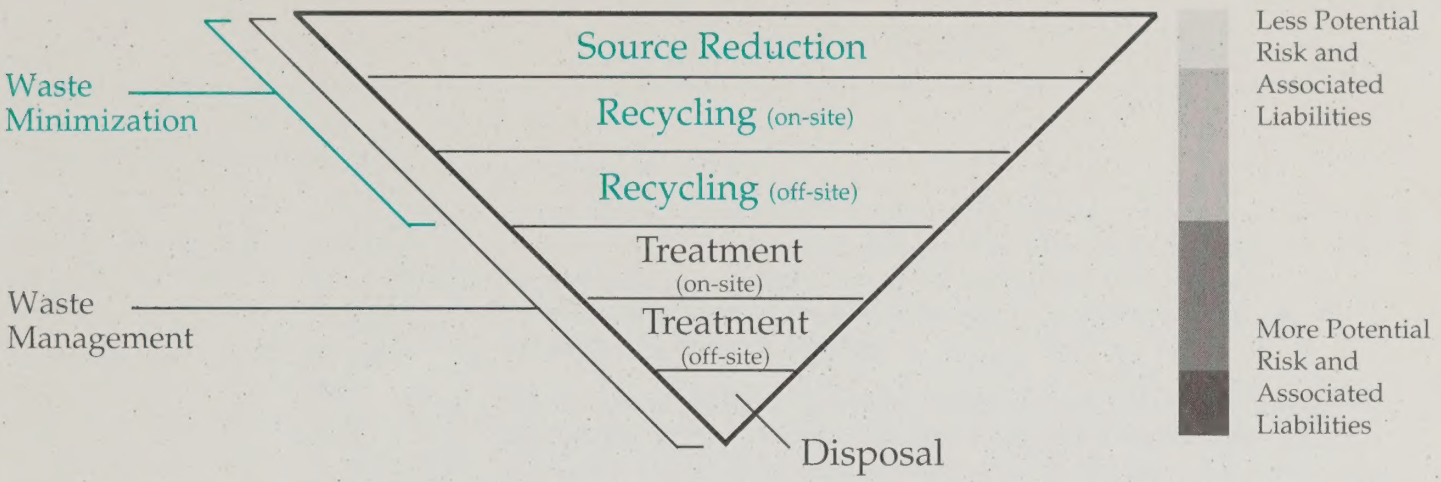


TABLE 1. WASTE MINIMIZATION & TREATMENT METHODS

Source Reduction

GOOD HOUSEKEEPING PRACTICES

- Purchasing & Inventory Control – e.g. first-in/first-out inventory management
- Waste/Material Segregation – e.g. separate wastestreams to enhance recovery potential
- Storage & Handling – e.g. use funnels or spigots to transfer liquids
- Preventive Maintenance – e.g. use double-sealed valves and pumps
- Scheduling Improvement – e.g. progress from light to dark colors to reduce cleanings

MATERIAL & PRODUCT CHANGES

- Change Input Materials – e.g. print with water- or soy-based ink instead of solvent-based ink
- Change Product Composition – e.g. manufacture water-based "white-out" instead of solvent-based
- Change Products Produced – e.g. manufacture concrete poles instead of chemically treated wood poles

TECHNOLOGY MODIFICATION

- Improved Controls – e.g. use automatic plating bath temperature and turbulence controls
- Process Modification – e.g. strip paint with "bead" blasting instead of solvent stripping
- Equipment Changes – e.g. add mechanical wipers to wipe out mixing vats or pipes

Recycling

USE/REUSE

- Return Material to Original Process – e.g. return dragout to process bath in plating operations
- Use as Raw Material in other Process – e.g. reuse acid bath rinses as influent to alkaline bath rinses

RECLAMATION

- Process to Regenerate Material – e.g. distill waste solvent for reuse
- Recover Raw Materials – e.g. recover silver from used photographic solutions

Treatment

PHYSICAL	• Filtration	• Reverse Osmosis	• Ion Exchange	• Electrolytic Processes
CHEMICAL	• Precipitation/Flocculation	• Neutralization	• Solidification/Stabilization	
THERMAL	• Evaporation/Distillation	• Incineration	• Fuel Blending	• Gasification
BIOLOGICAL	• Biodegradation			

Notes:

CHAPTER

Who Regulates What? 2

Case Study: Drycleaning

Mel's Cleaners in Santa Clara took a proactive approach to anticipated air quality regulations and dramatically reduced perchloroethylene ("perc") use, waste disposal, and air emissions since 1991.

Mel purchased two automated systems that eliminate the possibility of human variable and error inherent in traditional drycleaning methods:

- *A state-of-the-art solvent system automatically adds the correct quantity of solvent, soap, sizing, and brightener to each load and places the used mixture in a distillation unit when done.*
- *A closed-loop ("dry-to-dry") cleaning machine washes and dries clothes without removing them in between, and steams and condenses used perc from the spin filter during the drying cycle (eliminating the need for air quality control devices such as "sniffers").*

The new equipment is much more efficient and has resulted in dramatic reductions in perc use, hazardous waste generation, and associated costs:

- *Perc use went from 800 to 60 gallons/year – saving about $3,700/year.*
- *Other material costs (soap and filter cartridges) were about $6,800/year. New material costs (soap, sizing, brightener, 5-year spin filter) are about $3,200/year. A $3,600/year savings.*
- *Reduced labor requirements saves another $4,200/year.*
- *Hazardous waste generation went from 4.5 drums/month of waste perc to 1 drum/month of still bottoms and separator water, resulting in $3,000/year more savings.*

Although a significant investment, the total savings (about $14,500/year!) will pay for the new equipment in a little over 4 years, and Mel can easily comply with new air quality regulations. Additionally, employees appreciate the improved indoor air quality and more pleasant working environment.

Business may increase too – customers have noticed significant improvements in clothing brightness, body, and smell.

For more information call
Santa Clara County Pollution Prevention Program
408-441-1195

Introduction

A variety of agencies and programs are involved with safety and environmental protection. Businesses that generate hazardous wastes and/or use hazardous materials must comply with an increasing number of requirements. Understanding the requirements, or even "who regulates what," can be frustrating for smaller businesses.

This chapter provides an overview of agencies which are likely to regulate your company.* Each agency description (1) briefly describes the agency's focus, (2) summarizes key requirements, and (3) provides a list of resources available. Resources are *FREE* unless otherwise noted. Contact numbers are either provided or listed in the Phone Directory under the appropriate agency.

This chapter is not intended to be a comprehensive guide to compliance. The summaries serve only to inform you of applicable requirements. You should contact the individual agencies for full compliance details.

Be sure to notify all applicable agencies of any major changes your business is planning to make in the way it will use, store, handle, or dispose of hazardous materials or wastes. Applicable requirements may also change. Discussing your plans in advance may **save you time and money** by preventing any inappropriate investments.

Chapter Two Contents: Page

Agencies

- Santa Clara County Hazardous Materials Compliance Division 2-2
- Cal/EPA, Department of Toxic Substances Control 2-4
- Fire Department Hazardous Materials (HazMat) Units 2-5
- Bay Area Air Quality Management District 2-6
- Water Quality/Pollution Control Plants 2-6
- California Occupational Safety & Health Administration (Cal/OSHA) 2-8

Other Regulatory Programs

- SARA Title III, Section "313" 2-7
- Proposition "65" 2-9
- Santa Clara Valley Nonpoint Source Pollution Control Program 2-10
- Underground Storage Tank Removal & Cleanup 2-11

Phone Directory

- Agency Phone Numbers, Other Useful Numbers 2-12
- How to Order Manifests, Regulations, etc. 2-14

*The federal Environmental Protection Agency (EPA) and some other agencies are not included as major subject headings because regulatory implementation and enforcement is generally handled at the state, regional, or local level. However, they are listed in the phone directory.

Santa Clara County Hazardous Materials Compliance Division (HMCD), Environmental Resources Agency

HMCD is responsible for several programs:

- **Hazardous Waste Generator Program**
- **Risk Management and Prevention Program**
- **Hazardous Materials Storage Program**

Summary of Hazardous Waste Generator Program Requirements:

These regulations concern the "cradle to grave" management of hazardous wastes (from the instant they are created to their ultimate disposal or destruction through recycling, treatment, or incineration, etc.).

Unlike federal hazardous waste exemptions for very small quantity generators, the state of California allows ***NO*** *exemptions. Requirements apply to* ***ALL*** *generators.*

Regulations: Santa Clara County Hazardous Materials Storage Ordinance; H&S, Div. 20, Ch. 6.5 (Hazardous Waste Control Act), 6.8; CCR, Title 22, Div. 4.5, Chap. 30 (Environmental Health Standards for the Management of Hazardous Wastes); 40 CFR, Parts 260-270 (Protection of Environment).

These Requirements are Applicable to *All* Generators

- ❑ **Generator Permit** – Obtain a permit from HMCD. Fees are based on the quantity of waste generated.
- ❑ **State/EPA ID#** – Obtain a permanent, provisional (one-time-only), or emergency ID number by calling Cal/EPA or federal EPA (see directory). You will be sent an application. No fee for businesses with less than 50 employees.
- ❑ **Waste Analysis** – Determine if waste generated is hazardous based on listing in regulations, results of state certified laboratory analysis, MSDS, or other personal knowledge of the waste stream and process. Maintain written records of all applicable information and reasoning.
- ❑ **Storage** – Use hazardous waste labels and resealable containers (keep covered). Label storage areas properly, segregate wastes by hazard type, provide secondary containment, and maintain adequate aisle space.
- ❑ **Accumulation** – Wastes may be stored on site for 90 days without a state storage permit. If you generate 100 kg (about 220 lbs or 27 gallons) or less per month, your 90 days start when you have accumulated the first 100kg. (Limits are 1kg, 2.2lbs, or 1 quart for extremely hazardous waste.)
- ❑ **Transportation** – Follow DOT shipping requirements (see Directory) and:
  - Use a Uniform Hazardous Waste Manifest. Obtain from your hauler or the Dept. of General Services. ("Milk-run" service providers may use a modified manifest system.) Keep copies of manifests/receipts. Note: There is a $12/manifest use fee, except for the first 4/year used by a business with less than 100 employees.
  - Use a registered hauler with a state hauler # and EPA ID# (Exception: generators of 100 kg or less per month may transport up to 5 gallons or 50 pounds themselves. Certain conditions apply.)
  - Use an authorized hazardous waste management facility with an EPA ID#. (Refer to Appendix F for guidance on choosing reliable services.)
- ❑ **Employee Training** – Provide hazardous waste handling and emergency response training. Maintain employee training records.
- ❑ **Emergency Response Plan** – Covers steps to follow in the event of a disaster, accident or chemical spill which involves the release of hazardous wastes. Designates emergency coordinators, equipment, and procedures.

Contingency Plan ➡

Hazardous Waste Taxes

If you manifest (have off-site shipments of) more than ***500 pounds*** *of hazardous waste per year, you must file with the* ***State Board of Equalization's Environmental Fees Division*** *for "Superfund" and "Land Disposal" Taxes. (Recycling activities have a $0 tax rate.) For more information, call (916) 323-9555.*

If you generate ***EMPTY containers****, call HMCD for proper disposal information,* ***or*** *reduce the need for disposal.*
See page 4-5.

To order manifests, ➡ see page 2-14.

- ❑ **Weekly Monitoring** – Monitor all hazardous waste storage areas weekly to identify problem areas and prevent future spills or emergencies.
- ❑ **Waste Minimization** – Create, maintain and update a waste minimization plan and implement feasible elements.
- ❑ **Record Keeping** – All records (waste analysis manifests, training, monitoring, etc.) must be maintained on site and available for inspection for 3 years.
- ❑ **Inspection** – Annual inspection of permitted generators is standard.

← Also see "Biennial Report" submitted to DTSC, pg. 2-4.

Summary of Risk Management and Prevention Requirements:

"Acutely hazardous materials" are classified as acutely *toxic* and are listed on the federal EPA's "List of Extremely Hazardous Substances." Acutely hazardous materials requirements are precautionary measures designed to prevent releases of these materials.

Regulations: H&S, Div. 20, Ch. 6.5, sec. 25531 et seq.; 40 CFR, Part 355, Appendix A (List of Extremely Hazardous Substances).

These Requirements are Applicable *Only* to Users of Acutely Hazardous Materials

- ❑ **Acutely Hazardous Materials (AHM) Registration** – Required of all businesses which handle acutely hazardous materials in any quantity. Obtain registration form from HMCD. One-time fee.
- ❑ **Risk Management & Prevention Program (RMPP)** – Required of operations which HMCD determines present an "acutely hazardous materials accident risk." Includes administrative and operational steps designed to prevent such risks, and risk assessment of worst case release scenario.
- ❑ **Inspection** – RMPP facilities will be inspected at least once every 3 years.

← If AHMs are present at any one time in amounts greater than the federal "threshold planning quantity," the Chemical Emergency Planning and Response Commission (CEPRC) must also be notified.

Summary of Hazardous Materials Storage Requirements:

See description for "Fire Department – Hazardous Materials Units" on page 5.

These Requirements are Applicable to Users of any Hazardous Materials

Resources Available From HMCD:

- ❑ Generator Information Packet/Permit Application
- ❑ Contingency Plan Packet for hazardous waste generators
- ❑ AHM registration form and list of acutely/extremely hazardous chemicals

Other Available Resources:

- ❑ Hazardous waste management training classes at various community colleges. Call HMCD for more information.
- ❑ Risk Management and Prevention Program (RMPP) guidelines, State Office of Emergency Services.
- ❑ *Understanding the Small Quantity Generator Hazardous Waste Laws: A Handbook for Small Business*, C-10, 8/86, US EPA Small Business Ombudsman, (800) 368-5888. (Federal regulations only. Industry-specific inserts.)
- ❑ *Hazardous Materials & Waste Management Handbook*, 6/92, San Bernadino County, Dept. of Environmental Health Services, (714) 387-3080. (Comprehensive coverage of compliance requirements and more.) Free!
- ❑ *Hazardous Waste Management Guide*, 1991-1992, Los Angeles Hazardous Waste Management Program Committee of the CA Safety Council, (714) 848-8030. (Well organized, easy to read.) Free!
- ❑ *Hazardous Waste Management*, 1994, CA Chamber of Commerce, 1-800-331-8877. (Comprehensive handbook of CA hazardous waste laws, 95 pages plus appendices – including laws and regulations.) $49

← Resources

(DTSC's Consultative Services cover hazardous waste generator requirements. See Resources next page.)

In an Emergency, call: 9-1-1

(Also see pg. 2-5 for other "accidental release" reporting requirements.)

California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC)

What is Cal/EPA?

"Cal/EPA" was formed in July 1991, unifying the State's environmental authority under one agency. Cal/EPA now oversees and coordinates environmental protection activities within the Integrated Waste Management Board, Air Resources Board, Water Resources Control Board, Dept. of Pesticide Regulation, Office of Environmental Health Assessment, and Dept. of Toxic Substances Control (formerly a division of the Dept. of Health Services, "DHS").

Although the Hazardous Materials Compliance Division (HMCD) implements DTSC's responsibilities for enforcement of generator hazardous waste regulations in Santa Clara County, DTSC performs other activities which may affect generators.

DTSC remains responsible for overseeing activities involving treatment and storage of hazardous wastes, permitting for extremely hazardous wastes, receiving Biennial Reports from all generators, and implementing the State Hazardous Waste Source Reduction and Management Review Act of 1989.

Regulations: H&S, Div. 20, Ch. 6.5 (Hazardous Waste Control Act), 6.8; CCR, Title 22, Div. 4.5, Ch. 30 (Environmental Health Standards for the Management of Hazardous Wastes); 40 CFR, Parts 260-270 (Protection of Environment).

Summary of Requirements:

- ❑ **Biennial Report** – Required if your businesses generates more than 5 tons/year of hazardous waste. Due March 1st of even-numbered years. Covers generator activities during the previous calendar year, including a summary of waste minimization efforts. Maintain copies for 3 years. Call the Region II office regarding this report.
- ❑ **Extremely Hazardous Waste Permit** – Required if you store, handle, or dispose of extremely hazardous wastes (see glossary for definition).
- ❑ **Storage Permits/Variances**– Required of any facility storing hazardous wastes for more than 90 days.
- ❑ **Treatment Permits** – Required to perform treatment of hazardous wastes. Legislation effective January 1, 1993 established a "tiered" system of permitting, with levels of stringency based on the size and environmental risk of the treatment process. Notification of existing treatment activity within any tier was required by April 1, 1993. (Call the On-site Hazardous Waste Treatment Unit for more information and notification forms.)
- ❑ **Source Reduction Evaluation Review & Plan** and **Hazardous Waste Management Performance Report** – Required (by **"SB14"**) if you routinely generate 13 tons* of hazardous waste (or 26 lbs. of extremely hazardous waste) per year. Requires generators to review hazardous waste management practices for source reduction opportunities and report on effectiveness of current/past practices. Small businesses may use DTSC industry-specific checklists to satisfy requirements. **For certain wastes affected by land disposal restrictions/treatment standards, the threshold is 51/2 tons. Call for details.*
- ❑ **Inspection** – Facilities with storage or full/standardized treatment permits are inspected annually. Other permit tiers will be inspected every two years.

Treatment Permit Tiers

- Full Permit
- Standardized Permit
- Permit-By-Rule (PBR) ➡
- Conditional Authorization
- Conditional Exemption

(Note that there are also exemptions for onsite recycling. See sidepanel, page 1-4.)

Source Reduction Plan

- Complete by 9/1/91
- Update every 4 years
- Have readily accessible ➡
- State will call in at least 2 categories of plans for review every 2 years.

Resources ➡

Resources Available From The Region II Office of DTSC:

- ❑ Permit forms, guidance documents, and other information.
- ❑ Consultative Services (Reasonable cost, on-site consultation and training for small businesses. Completely separate from enforcement functions.)

Resources Available From The DTSC Office of Pollution Prevention & Technology Development:

- ❑ Hazardous Waste Source Reduction & Management Review Act of 1989: Fact Sheet, Guidance Manual and Appendices, Compliance Checklist
- ❑ Factsheet: Treatment Standards for Non-RCRA Hazardous Wastes
- ❑ Factsheets: Handling, transport, and recycling/disposal of spent lead-acid batteries, used oil, used oil filters, asbestos, PCBs, or lighting wastes
- ❑ Various waste minimization publications. (See Appendix A.)

Local Fire Departments Hazardous Materials ("HazMat") Units

Local HazMat units are responsible for regulating businesses which handle hazardous materials. They are concerned with the storage (above and underground), use, and handling of all hazardous materials, including hazardous wastes, and planning and preparation for related emergencies.

In most of the county, HazMat units are part of the local fire department. In Los Altos, Los Altos Hills, Monte Sereno, Saratoga and unincorporated areas, the County Hazardous Materials Compliance Div. (HMCD) is the acting HazMat unit.

Regulations: Local Hazardous Materials Storage and Toxic Gas Ordinances; Uniform Fire Code, Art. 51, 79, 80; H&S, Div. 20, Ch. 6.7, 6.95; CCR, Title 19; USC, Title 42, sec. 11001 et seq.; 40 CFR, Parts 300, 350, 355, 370, 372 (SARA Title III).

Summary of Requirements:

- ❑ **Hazardous Materials Permit** – Required annually from your local HazMat unit. Fee based on quantity and type of hazardous materials on site.
- ❑ **Hazardous Materials Business /Management Plan (HMBP/HMMP)** – Maintain and update regularly. Includes the following elements:
  - Emergency Response Plan
  - Training Plan
  - Monitoring Plan
  - Site/Building Layout
  - Hazardous Materials/Waste Inventories
- ❑ **Short-Form Hazardous Materials Business Plan** – Some HazMat units have a "short-form" for businesses which store/handle hazardous materials in very small quantities.
- ❑ **Storage & Safety** – Clearly label contents of all containers. Additionally:
  - Provide secondary containment and monitor storage areas
  - Placard building exterior and storage areas/enclosures
  - Maintain/test emergency equipment and supplies
- ❑ **Record Keeping** – Maintain records of monitoring, training, waste disposal, and monitoring equipment service/maintenance.
- ❑ **Inspection** – HazMat inspections are standard once or twice yearly.
- ❑ **Accidental Release Reporting** – Immediately report and adequately describe any release or threatened release of hazardous materials to the environment to the local fire department by calling 9-1-1. Also notify HMCD, your local HazMat unit and the state Office of Emergency Services (OES).
- ❑ **Storage Tank Installation or Removal** – Permit required. See page 2-11 for information on underground storage tank removal and cleanup.
- ❑ **Facility Closure** – Closure permits are required for whole or partial closure of hazardous materials facilities.

Resources Available From Your HazMat Unit:

Information packets and permit applications are available for the following:

❑ HMBP/HMMP ❑ Facility Closure ❑ Storage Tank Installation or Removal

Other Available Resources:

- ❑ *Hazardous Material Emergency Planning & Community Right-to-Know: A Comparison of California & Federal Requirements*, 4/91, Office of Emergency Services. (Clarifies differences in requirements and implementation.)
- ❑ *Community Right-to-Know*, 1992, CA Chamber of Commerce, 1-800-331-8877. (Guide to developing a Business Plan, taking inventory, outlining emergency procedures in a step-by-step approach.) $45
- ❑ *Emergency Response Guidebook*, DOT, (Guidance for initial response to hazardous materials incidents.) Order: CA Trucking Assoc. 1-800-CTA-SAVE, $5.75

Fire Prevention Visits

Fire departments conduct fire prevention inspections of all businesses. Some departments conduct these visits at the same time they inspect for hazardous materials requirements. Others conduct these visits separately. Call your department to find out the procedure in your area.

⬅ Business Plan

- Update inventory annually
- Update plan every 2 years

*(A list of chemicals by hazard category must also be submitted to CEPRC, care of OES. Submit 2 copies. Call OES for information.)

⬅ *If a released material is on the list of extremely hazardous substances or is a reportable quantity of a CERCLA substance (call County HMCD to find out), then the National Response Center must also be notified and a post-incident written report sent to CEPRC. Call OES for more information.

⬅ Resources

Free Guide!

Get "California Hazardous Material Spill/Release Notification Guidance" free by calling OES at (916) 262-1750.

*refer to list of acronyms, page G-1

Bay Area Air Quality Management District (BAAQMD)

BAAQMD is responsible for regulating stationary sources of air pollution in the San Francisco Bay region. Requirements pertain to both equipment and processes of facilities which may generate air emissions.

BAAQMD must also (1) identify air toxic "hot spots" and prioritize high risk facilities, (2) review industry health risk assessments, and (3) make this information available to the public.

The state Air Resources Board (ARB) oversees activities of all local air districts in the state, though each has direct regulatory authority under state law. Cal/EPA oversees ARB activities, and thus indirectly local activities as well.

Regulations: BAAQMD Rules and Regulations; H&S, Div. 26, sec. 39000 et. seq.

Typical Small Businesses Regulated by BAAQMD

- *Dry Cleaners*
- *Print Shops*
- *Gas Stations*
- *"Coating" Operations (i.e. body shops, wood finishing, other coating processes, etc.)*
- *Semiconductor Mfg.*
- *Solvent Users*

Summary of Requirements:

- ❑ **Authority to Construct** – Required for installation of new equipment or facility construction/modification of regulated industries/processes.
- ❑ **Permit to Operate** – Required to operate new or modified facilities or equipment of regulated industries/processes. Also required of existing facilities in order to be in compliance.
- ❑ **Performance Standards** – Regulated industries/processes must meet standards for (1) equipment, (2) materials, and (3) operation (even if a particular facility does not require a permit).
- ❑ **Health Risk Assessment** – Required of identified "high priority" facilities.
- ❑ **Inspection** – Permitted facilities are inspected annually. Non-permitted facilities may be inspected as well.

Compliance Assistance (COMPASS) Program

One-on-one assistance, technical advisors, facility review, information clearinghouse, small business compliance school. For more information, call the COMPASS Hotline: (415)749-4999.

Resources ➡

Resources Available From BAAQMD:

- ❑ COMPASS Program brochure describing services
- ❑ BAAQMD Rules and Regulations
- ❑ Permit packets for specific industries
- ❑ Pamphlets on permitting and regulation of specific industry processes
- ❑ Handout: Questions & Answers about the Air Toxics "Hot Spot" Assessment Program (AB2588)

Handbooks are available for:

- *Aerospace Coating Industry*
- *Agricultural Burning*
- *Automotive Refinishing**
- *Cargo Tank Vapor Recovery*
- *Gasoline Facility Vapor Recovery*
- *Hot Mix Asphalt*
- *Solvent Cleaners*
- *Surface Coating of Metal/Plastic Parts & Products**

**Also available in Spanish.*

➡

Resources Available From The Air Resources Board:

- ❑ Self-inspection handbooks for specific industries/processes
- ❑ Technical manuals for specific industries/processes

Water Quality/Pollution Control Plants (POTW – Publicly Owned Treatment Works)

Does your business discharge wastewater to the Sanitary Sewer?

Your local POTW (Palo Alto Regional plant, Sunnyvale plant, San Jose/Santa Clara plant, or Gilroy/Morgan Hill plant) regulates all industrial discharges to the sanitary sewer system.

Hazardous wastes may not be discharged to the POTW. Wastewaters which meet, or are treated to meet, POTW limitations may be discharged with a permit. (Note: Treatment units may require an additional permit from DTSC.)

Regulations: Local Industrial Waste Discharge Regulations; 40 CFR, Part 403 (Federal Pretreatment Regulations); 40 CFR, Parts 405-471 (Federal Categorical Standards).

Summary of Requirements:

Individual POTW requirements differ greatly. Contact your local plant for specific information. Ask for the Industrial Waste or Source Control section.

- ❑ **Discharge Permit** – Required to discharge any industrial wastes. Limits typically set for metals, organics, pH, etc. Typically require inspections, recordkeeping, sampling, and monitoring.
- ❑ **Zero-Discharge Facilities** – Most plants require some type of certification that a facility does not discharge to the POTW (especially if a particular industry typically has wastewater discharges).
- ❑ **Waste Minimization Plan** – Most of the plants have waste minimization plan requirements.

Resources Which May Be Available From Your POTW:

- ❑ "Best Management Practices" or Waste Minimization Plan guidance documents
- ❑ Discharge requirements/Municipal ordinance
- ❑ Other educational materials

Also see Appendix A for more waste minimization resources.

⬅ POTWs, cont.

Be sure to coordinate with SB14 plans (see pg. 2-4) if it applies to your business.

⬅ Resources

SARA Title III Section 313: Toxic Chemical Release Inventory

Passage of SARA Title III created several federal reporting requirements for companies that handle toxic chemicals. (Many are incorporated into the reporting requirements on page 2-5 under "HazMat" agencies.)

Section 313 of Title III requires that certain manufacturers report annual releases to the environment of the listed toxic chemicals they use. Suppliers of listed chemicals and products containing listed chemicals are also required to notify their customers of the presence of "313" chemicals.

Regulations: 40 CFR 372

Call the EPA Emergency Planning & Community Right-to-Know (Title III) Information Hotline for more details: 800-535-0202.

Summary of Requirements:

- ❑ **Annual Toxic Chemical Release Report** (EPA Form R) – Businesses that meet one or more of the following criteria must file a Form R:
  - SIC codes 20-39
  - Manufacture or process more than 25,000 lbs/yr of listed chemicals, OR
  - Use more than 10,000 lbs/yr of listed chemicals in any other way
- ❑ **Supplier Notification** – Businesses which sell or distribute mixture or trade name products containing listed chemicals (to customers in SIC 20-39 or who redistribute to firms in SIC 20-29) must provide customer notification or pass on, unchanged, notices provided by the original manufacturer or supplier.

⬅ A copy must also be sent to the Cal/EPA Office of Environmental Information.

Resources Available From Federal EPA Title III Hotline:

- ❑ List of chemicals regulated under SARA Title III Section 313
- ❑ Form R and instructions for completing it
- ❑ Release estimating guidance documents

⬅ Resources

California Occupational Safety & Health Administration (Cal/OSHA)

Division of Occupational Safety & Health (DOSH)
California Department of Industrial Relations

A Good Idea

Your workers' comp provider may provide services or information that can help you maintain a safe workplace. Find out. You may ***save money*** *on your premiums while making Cal/OSHA compliance easier.*

Cal/OSHA operates a federally approved occupational safety and health program in order to ensure safe and healthful working conditions for California workers.

DOSH is the enforcement branch of Cal/OSHA. Regulations apply to all workers/employers in the state, including government agencies (except federal).

Regulations: CCR, Title 8 (General Industry Safety Orders); California Labor Code, sec. 6300 et. seq.

Summary of Major Requirements:

Written Plan ➡

- ❑ **Injury & Illness Prevention Program** – Includes the following elements:
  - Identified person(s) responsible for implementing program
  - Periodic inspections to identify unsafe conditions and practices
  - Procedures for expedient correction of unsafe/unhealthful conditions and accident investigation
  - Safety training: (1) general, all employees; (2) specific
  - Recordkeeping of items above (inspection, corrective action, training)
  - 2-way communication system for sharing of information
  - Enforcement/disciplinary system to insure use of safety practices

Written Plan ➡

Be sure to incorporate into your Injury & Illness Prevention Program to avoid duplication of effort!

- ❑ **Hazard**(ous Substances) **Communication Program** – "Right-to-Know" applies to hazardous substances that employees may be exposed to under normal working or foreseeable emergency conditions. Covers:
  - Inventory lists of hazardous substances
  - Material Safety Data Sheets (MSDS) (must keep readily accessible)
  - Labels/other forms of warning
  - Employee information & training
- ❑ **Access to Medical & Exposure Records** – Workers must have access to:
  - Personal medical records and records of exposure to toxic substances and harmful physical agents
  - Exposure records of employees with similar past or present jobs
  - Material Safety Data Sheets (MSDS) or equivalent information on chemicals/substances used in the workplace
- ❑ **Carcinogen Control** – Special requirements for workers handling carcinogenic (cancer causing) substances.
- ❑ **Inspections** – Inspections are unannounced and initiated/prioritized by imminent danger; fatality or serious accident; employee complaint; serious injury/illness investigation; and scheduled discretionary visits.
- ❑ **Reporting Requirements** – Employers must report work-related fatalities or serious injuries/illnesses *immediately* (24 hrs) to the nearest DOSH office.
- ❑ **Recordkeeping** – A "Log 200" (summary of occupational injuries/illnesses) must be kept on a calendar-year basis, posted annually during February, and retained for 5 years. Required of all employers except those with no more than 10 employees at any time during the previous year.

HESIS
(Hazard Evaluation System & Information Service)

Provides information to workers, employers, and health professionals about the health effects of toxic substances and how to use them safely. Call collect from within California: (510) 540-3014.

Resources ➡

Resources Available From Cal/OSHA:

- ❑ *A Guide to Cal/OSHA* – brochure explaining general requirements of State law concerning occupational safety and health and the functions of Cal/OSHA.
- ❑ "Log 200" and *A Brief Guide to Recordkeeping Requirements for Occupational Injuries & Illnesses.*
- ❑ Cal/OSHA "Safety & Health Protection" poster and list of other required workplace posters.

- ❑ *Your workplace Injury & Illness Prevention Program* – a guidance manual with checklists for self-inspection.
- ❑ *Sample Injury & Illness Prevention Program* – provides essential framework for customization. Suggested policies, forms, procedures and practices.
- ❑ *Employer's Guide to the California Hazard Communication Regulation* – booklet provides step-by-step approach to developing a Hazard Communication Program. Includes sample written program and checklist.
- ❑ *Hazard Communication* – reprint of General Industry Safety Orders, Title 8 CCR, section 5194
- ❑ *On-site Consultation* – brochure describing Cal/OSHA's non-enforcement, free consultation services.
- ❑ List of regulated carcinogens.

Resources Available From The California Chamber of Commerce:
For more information or to order, call (800) 331-8877.

- ❑ *Cal/OSHA Handbook,* 1992. (IDs applicable regulations, step-by-step instructions, recordkeeping, training, how to prepare for inspection.) $45
- ❑ *SB 198 Handbook,* 1992. (How to write your own Injury & Illness Prevention Program.) $45
- ❑ *Hazard Communication Handbook,* 1994. (Six-step approach to develop program, fill-in-the-blanks plan, how to conduct training (also meets Prop 65 requirements). $35
- ❑ *Cal/OSHA Organizer.* (A Cal/OSHA compliance and safety system; complete all documentation requirements in one place.) $25
- ❑ *Complete Cal/OSHA Kit.* (All four of the above documents at $21 savings.) $129
- ❑ *Cal/OSHA Beyond the Basics.* (New/proposed regulations.) $69, $120 update service

⬅ **Resources, cont.**

Cal/OSHA Consultation Service

Provides free on-site consultation to employers and advice and information regarding occupational safety and health to employers and employee groups.

The Consultation Service is not involved in enforcement activities. However, employers do have an obligation to correct any serious hazards identified.

"Proposition 65"

Safe Drinking Water & Toxic Enforcement Act of 1986

Passed by voter initiative, this act requires the Governor to publish and annually update a list of chemicals known to the State to cause cancer or reproductive toxicity.

For listed chemicals, businesses with 10 or more employees are required to comply with the requirements listed below. Certain exemptions may apply.

Regulations: H&S, Div. 20, Ch. 6.6; CCR, Title 22, Div. 21.5, sec. 12000

Summary of Requirements:

- ❑ **Discharge Prohibition** – Knowing discharge of listed chemicals to sources of drinking water is prohibited 20 months after listing.
- ❑ **Exposure Warning** – Clear and reasonable warning for knowing and intentional exposure to listed chemicals is required within 12 months after listing. The warning requirement applies to potential employee, visitor, and community exposures, as well as consumer exposure through use of a product.

Call Cal/EPA's Office of Environmental Health Assessment for further information.

⬅ **Resources**

Resources Available From Cal/EPA Office of Environmental Health Assessment:

- ❑ Current list of Prop 65 chemicals
- ❑ Copy of the state statute (law)
- ❑ Prop 65 Summary and Progress Report

Other Available Resources:

- ❑ *Proposition 65 Compliance,* 1992 ('94 soon), CA Chamber of Commerce, 1-800-331-8877. (How-to handbook for nontechnical business managers.) $40

Multi-Agency Programs:

Santa Clara Valley Nonpoint Source Pollution Control (NPS) Program

The NPS program is a cooperative effort of the Santa Clara Valley Water District (SCVWD), Santa Clara County, and the 13 cities in the county from which storm water flows into south San Francisco Bay (excludes Morgan Hill and Gilroy). The SCVWD manages and coordinates the Program, but each jurisdiction is responsible for implementing agency-specific activities locally.

The Program results from several regulatory developments: (1) federal regulation of municipal and industrial storm water discharges, (2) San Francisco Bay Regional Water Quality Control Board 1991 Basin Plan requirements, (3) new State Water Resources Control Board regulations, and (4) the listing of south San Francisco Bay as an "impacted body of water" under the Clean Water Act (sec. 304(l)).

In response to these requirements, efforts to control nonpoint source pollution (see side panel) are being directed at both the residential and business communities.

Summary of Requirements/Activities:

The NPS Program impacts industry through various control activities:

- ❑ **Illegal Dumping Elimination** – The Program identifies and eliminates intentional dumping of wastes into storm drains, open channels, and other water ways.
- ❑ **Illicit Connection Elimination** – The Program identifies and eliminates unauthorized connections to the storm drain system.
- ❑ **Industrial Dischargers Program** – The Program identifies sources of industrial runoff and controls industrial contamination of storm water through voluntary and regulatory (permit) methods.

  Specific industries need to file with the State Water Resources Control Board for coverage under general storm water discharge permits unless they can show that industrial contamination of storm water will not occur.

  Permits involve:
  - Filing of a Notice of Intent (NOI)
  - An annual fee
  - Prohibition of unauthorized non-storm water discharges into storm drains, open channels, and other waterways
  - Development and implementation of a Storm Water Pollution Prevention Plan (measures to prevent contamination of storm water/runoff by industrial materials or substances)
  - Development and implementation of a monitoring program
  - Reporting requirements

  A permit ***will no longer be required*** once a facility eliminates the potential for contamination of storm water and other runoff.

Resources Available From The NPS Program:

- ❑ *Storm Water Pollution Control Compliance Manual*, 6/92, $25 (Step-by-step guide to filing, obtaining a permit, and compliance.)
- ❑ Industry-specific "Best Management Practices" manuals and brochures as developed. (Currently available for industrial facilities, automotive repair, construction trades and roadwork, landscape/gardening and pool maintenance, mobile cleaners and detailers, and restaurants. Call for information about other manuals planned for production.)
- ❑ "Best Management Practices" poster for automotive repair shops

Nonpoint Source Pollution: What Is It?

Unlike water pollutants that come from a single point source, such as factory or sewage treatment plant outflows, "nonpoint source pollutants" are washed off by rainfall and carried away by storm water from all over: streets, neighborhoods, farmlands, construction sites, parking lots, uncovered work areas, and other exposed surfaces.

Because storm drains are separate from the sanitary sewer system, these polluted waters flow directly into the creeks and bay without treatment, damaging aquatic life and water quality.

The primary pollutants of concern from urban industries are heavy metals (especially cadmium, copper, lead, mercury, nickel, and zinc) and oil and grease.

Storm Water Drainage Well (Dry Well) Registration

Dry wells have been known to cause groundwater contamination and are regulated under federal, state, and local programs. Continued use or destruction of existing wells or construction of new wells requires notification of the SCVWD. For more information, contact the Groundwater Protection Advisor at (408) 927-0710.

Resources ➡

Call the NPS Program Information Line at 800-794-2482 for additional information.

Underground Storage Tank (UST) Removal & Cleanup

Several government agencies may be involved in the removal or in-place closure of tanks, sumps, or piping, especially if soil or groundwater contamination is found. The potentially involved agencies' responsibilities are described below.

Facility owners have responsibility to investigate and clean up a site if pollution is found, and may be liable for third party injury or damage. (See side panel for financial assistance opportunities.)

Summary of Requirements and Agencies Involved:

- ❑ **HazMat Unit** (Fire Dept. or county Hazardous Materials Compliance Division (HMCD))
  - Oversees tank, sump, and piping removal or in-place closure and initial soil sample collection. Permit required.
  - Reports pollution cases (as "unauthorized releases") to HMCD, RWQCB, and SCVWD.
  - Should receive notification of possible explosion hazards during various cleanup activities, such as above ground bioremediation or aeration.
  - Remediation systems using hazardous materials may require a permit.
- ❑ **Santa Clara Valley Water District (SCVWD)**
  - May require additional testing of soils/groundwater if pollution of any detectable concentration is found during required soil sampling.
  - Provides oversight of soil and groundwater investigation and cleanup of sites contaminated by fuel.
- ❑ **Regional Water Quality Control Board (RWQCB)**
  - Provides oversight of soil and groundwater investigation and cleanup of sites contaminated by substances other than fuel.
  - Provides enforcement when investigation or cleanup is not being done as requested by the SCVWD or the RWQCB.
  - Provides regulatory control for disposal of groundwater to storm drains.
  - Certifies completion of investigation and cleanup of soil and groundwater pollution cases.
- ❑ **Bay Area Air Quality Management District**
  - Provides guidance and regulations for control of air emissions from above ground soil and groundwater treatment systems and open excavation pits.
  - Must be notified prior to tank removal.
  - Should be notified if above ground soil treatment is being planned.
- ❑ **Cal/EPA, Dept. of Toxic Substances Control (DTSC), Region 2**
  - Should be notified if any treatment is being planned.

Resources Available:

- ❑ UST Removal Packet and permit application, local HazMat Unit.
- ❑ Brochure: *Soil Decontamination & Your Local Air Pollution Control District,* Cal/EPA Air Resources Board, Compliance Assistance Program.
- ❑ Regulation 8, Rule 40: Tank removal, soil excavation, and aeration, Bay Area Air Quality Management District.
- ❑ Guidance documents for fuel cleanup actions, SCVWD at (408) 927-0710 X 649.
- ❑ Guidance and resources for innovative soil treatment and disposal options, Cal/EPA DTSC, Office of Pollution Prevention & Technology Development; call (916) 322-3670 to ask for a publications list and/or specialist.

$ FUNDS AVAILABLE $

UST Loan Program

Loans to help small businesses repair, replace, remove, or upgrade problem USTs to meet applicable local, state and/or federal standards. Also for clean-up of sites contaminated by leaking USTs. Covers up to 90% of costs.

- *Amount: $30,000 – $350,000 (up to $50,000/tank)*
- *Applications: year round*

Call/Write: (510) 652-5262
Bay Area Small Business Development Corporation
3932 Harrison Street
Oakland, CA 94611

UST Cleanup Fund

Grants to fuel leak site owners/tank operators (in compliance with cleanup orders) for reimbursement/prepayment of corrective action costs and liability incurred after 1/1/88. "First come, first served" basis in the following priority: (1) residential property; (2) small businesses; (3) businesses with less than 500 employees; (4) all other claims.

- *Amount: up to $990,000/site*
- *Applications: year round*

Call/write: (916) 739-2475
State Water Resources Control Board, UST Cleanup Funds
P.O. Box 944212
Sacramento, CA 94244-2120

⬅ Resources

Phone Directory

Emergency Response & Spill Reporting

Free Guide!
Get "California Hazardous Material Spill/Release Notification Guidance" free by calling OES at (916) 262-1750.

EMERGENCY RESPONSE **9-1-1**

EMERGENCY INFORMATION: CHEMTREC (800) 424-9300
(24 hour service of the Chemical Manufacturer's Association: provides emergency product information; will put in contact with private response personnel.)

*SPILL/RELEASE REPORTING:**
Santa Clara County Hazardous Materials Compliance Division (HMCD) and local HazMat unit. See below.
Office of Emergency Services (OES) 1-800-852-7550 or (916) 262-1621
National Response Center *(see pg. 2-5)* (800) 424-8802
**Review specific laws and regulations for additional reporting requirements.*

Poison Control & Health Hazards

POISON CONTROL CENTER (emergency/urgent calls) (408) 299-5112
OCCUPATIONAL MEDICINE PROGRAM (408) 299-8800
HAZARD EVALUATION SYSTEM & INFORMATION SERVICE (510) 540-3014
(Health effects and safe use of hazardous substances in the workplace.)

Local & Regional Agencies

SANTA CLARA COUNTY
Hazardous Materials Compliance Division (HMCD) (408) 299-6930
(Hazardous waste enforcement/regulatory information.)
Pollution Prevention Program (408) 441-1195
(Waste management/reduction resources, referral to appropriate regulatory agencies, etc.)

HAZARDOUS MATERIALS UNITS (City Fire Dept. "HazMat" unit or as noted.)
Central Fire District (Campbell, Cupertino, Los Gatos) (408) 378-4015
Santa Clara County HMCD (unincorporated areas, Los Altos, Los Altos Hills, Monte Sereno, Saratoga) (408) 299-6930

Ask to speak with a Hazardous Materials Inspector ➡

Gilroy	(408) 848-0370	Palo Alto	(415) 329-2324
Milpitas	(408) 942-2386	San Jose	(408) 277-4659
Morgan Hill	(408) 776-7351	Santa Clara	(408) 984-3084
Mountain View	(415) 903-6378	Sunnyvale	(408) 730-7212

WATER QUALITY/POLLUTION CONTROL PLANTS

Ask for the Industrial Waste or Source Control Section ➡

Gilroy/Morgan Hill (Fire Dept. Chemical Control Division) (408) 848-0370
Serves: Cities of Gilroy and Morgan Hill

Palo Alto Regional Water Quality Control Plant (415) 329-2598
Serves: Cities of Palo Alto, East Palo Alto, Mountain View, and Los Altos; Town of Los Altos Hills; Stanford Campus

San Jose/Santa Clara Water Pollution Control Plant (408) 945-5300
Serves: Cities of San Jose, Santa Clara, and Milpitas; Burbank, Sunol, and Cupertino Sanitary Districts, City of Cupertino; County Sanitary District No. 2-3; West Valley Sanitation District: Cities of Campbell, Los Gatos, Monte Sereno, and Saratoga

Sunnyvale Water Pollution Control Plant (408) 730-7270
Serves: City of Sunnyvale; Portion of Moffett Field; Rancho Rinconada Sanitation District, City of Cupertino

SANTA CLARA VALLEY WATER DISTRICT (408) 265-2600
Groundwater Protection (dry wells, fuel leaks, etc.) (408) 927-0710

SANTA CLARA VALLEY NONPOINT SOURCE POLLUTION CONTROL (NPS) PROGRAM HOTLINE (800) 794-2482

Local & Regional Agencies, cont.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT (415) 771-6000
- Compliance Assistance (COMPASS) Program (415) 749-4999
- Complaints Line (odor, emissions, etc.) (800) 334-ODOR

REGIONAL WATER QUALITY CONTROL BOARDS (RWQCB)
- Central Coast *(Morgan Hill, Gilroy)* (805) 549-3147
- San Francisco Bay *(Rest of Santa Clara County)* (510) 286-1255

State Agencies

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY (Cal/EPA)
- Office of Environmental Health Hazard Assessment (916) 445-6900
  - Office of Environmental Information (916) 327-1848
- Air Resources Board (ARB) (916) 445-4383
  - Compliance Assistance Program *(Handbooks, etc.)* (916) 327-7211
- Integrated Waste Management Board (916) 255-2200
- Water Resources Control Board (WRCB) (916) 657-2390
- Department of Pesticide Regulation (916) 654-0551
- Department of Toxic Substances Control (DTSC)
  - Region II Offices (510) 540-3729
    - Permit Information (510) 540-2122
    - Consultative Services Program (510) 540-3732
  - State Offices *(Reference Line)* (916) 322-0476
    - Pollution Prevention & Technology Development (916) 322-3670 *(Waste reduction, recycling, alternative technology)*
    - California Waste Exchange (916) 322-4742
    - Classification of Wastes (M-F, 8am-12pm) (916) 322-7676
    - EPA/State ID Numbers (916) 324-1781
    - List of Certified Laboratories (510) 540-2800
    - On-site Hazardous Waste Treatment Unit (916) 323-5871
    - Transportation Unit *(List of registered haulers, etc.)* (916) 324-2430
    - Treatment Standards/Land Disposal Restrictions (916) 324-7663

CALIFORNIA HIGHWAY PATROL (CHP)
- Hazardous Materials Section *(Transporter requirements)* (916) 327-3310

CALIFORNIA OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (Cal/OSHA), DIVISION OF OCCUPATIONAL SAFETY & HEALTH (DOSH)
- Enforcement – Local District (408) 452-7288
- Consultation Service – Area Office (415) 573-3862
- Consultation Service – Headquarters (415) 703-4050

OFFICE OF EMERGENCY SERVICES (OES)
- Reporting hazardous materials spills 1-800-852-7550 or (916) 262-1621
- Hazardous Materials Division, Headquarters (916) 262-1750
  - also for California Emergency Planning & Response Commission (CEPRC)
- Hazardous Materials Division, Region II (510) 646-5946
  - also for Local Emergency Planning Commission (LEPC)

OFFICE OF SMALL BUSINESS (916) 445-6546
- Small Business Advocate Helpline *(Automated info/directory.)* (916) 327-HELP

DEPARTMENT OF TRANSPORTATION (DOT)
- Hazardous Materials Information Exchange *(DOT sponsors #)* (800) 752-6367
- Local DOT Office of Motor Carriers (916) 551-1300

(Both provide information regarding federal hazardous materials transportation requirements, including proper packaging.)

← *Also the general "Help Desk" for Cal/EPA.*

Ask about the zip-code tailored ***Guide to Hazardous Substance Reporting Requirements*** *($30).*

← *Free publications!*

← *EPA ID #s: Generators of more than 100kg (220lbs or 27gal.) per month, see number listed under Federal EPA.*

California Small Business Guide to Government Services

A catalog of major federal and state assistance programs and service agencies designed to aid the small business person. Available for $7.00 from Senate Publications. Call (916) 327-2155 for more information.

← Ask about the ***California Licensing Handbook*** ($16) and local Small Business Development Centers.

Federal Agencies

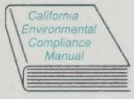
Federal Agencies, cont.

EPA ID #s: Generators of 100kg (220lb or 27gal.) or less per month, or of "California only" regulated wastes, see number listed under Cal/EPA. ➡

ENVIRONMENTAL PROTECTION AGENCY (EPA)

Region IX		(415) 744-1500
EPA ID numbers		(415) 495-8895
RCRA/Superfund Hotline	D.C.	(800) 424-9346
(Federal hazardous waste regulations)	Region IX	(415) 744-2074
Hazardous Waste Ombudsman	D.C.	(202) 260-9361
(Assists in voicing complaints or resolving issues)	Region IX	(415) 744-2110
Small Business Ombudsman/Hotline		(800) 368-5888
(EPA compliance assistance)		
Emergency Planning & Community Right-to-Know (SARA Title III) Hotline		(800) 535-0202

Other Regulatory Compliance Assistance



The California Chamber publishes 4 environmental compliance guides, including the *California Environmental Compliance Handbook* ($49), an overview of significant programs. All 4 guides, an organizer, and 1-year subscription to *Regwatch* are available as a set ($219). Videos and software also available.

NORTHERN CALIFORNIA BUSINESS ENVIRONMENTAL ASSISTANCE CENTER (BEAC) 1-800-799-BEAC

(Regulatory compliance information, technical assistance, education, and training.)

CALIFORNIA SPECIALIZED TRAINING INSTITUTE (805) 549-3344

An institution of the Office of Emergency Services (OES)
(Provides training in hazardous materials response.)

CALIFORNIA CHAMBER OF COMMERCE 1-800-348-2262

(Publish various environmental compliance guides, conduct seminars, and staff a "Helpline.")

UNIVERSITY OF CALIFORNIA EXTENSION PROGRAM (408) 748-7380

(Hazardous materials certificate program and classes.)

To Order . . .

UNIFORM HAZARDOUS WASTE MANIFESTS

Dept. of General Services
Documents & Publications
P.O. Box 1015, North Highlands, CA 95660
Call (916) 574-2200 for information only (no phone orders).

Price includes tax/shipping:
50 for $14.80
400 for $70.00

Resources listed in the agency sections and information provided by the agencies should suffice for most small business compliance efforts.

LOCAL ORDINANCES/REGULATIONS

Call the local regulating agency or the city/county clerk.

CALIFORNIA HEALTH & SAFETY CODE (H&S),

Division 20, Chapters 6.5-6.98 (Hazardous Waste Control Law)
Dept. of General Services (see "Manifests" above), $29.70

OTHER CALIFORNIA CODES

West Publishing sells annotated state and federal codes and provides on-line assistance. Call: 1-800-328-9352.

CALIFORNIA CODE OF REGULATIONS (CCR)

Barclay's Law Publishers
P.O. Box 3066, South San Francisco, CA 94083
Phone orders accepted: (415) 244-6611

All Titles available.
Call for order form.

CODE OF FEDERAL REGULATIONS (CFR), UNITED STATES CODE (USC)

U.S. General Printing Office (GPO) Bookstore
450 Golden Gate Ave., San Francisco, CA 94102
Call to check availability and price: (415) 252-5334

Also West Publishing. See "Other California Codes" above.

State and federal laws and regulations are also available for free viewing at most college and main public libraries.

LISTS OF REGULATED SUBSTANCES

List of Lists, call Cal/EPA Office of Environmental Information.
(Combined list of chemicals/substances regulated by various programs.)
Also see pages 2-3, -7, -8, and -9 for individual lists of programs addressed.

CHAPTER 3

Your Waste Minimization Program

Case Study: Auto Repair

Larry's AutoWorks, a Mountain View automotive repair shop, has practiced hazardous waste reduction since 1989. The shop's "total quality" approach makes it environmentally sound and successful.

Through profit-sharing, a unique benefit in this industry, Larry provides strong incentive to employees for performing well and cost-effectively. From customer service to repair work to hazardous waste management, each employee is held accountable for their individual performance. Minimizing the hazardous waste needing to be managed is one way the shop tries to operate efficiently. To this end, Larry . . .

- *Uses services to recycle all cleaning solvents, waste oil and oil filters, antifreeze, and shop rags.*
- *Wet-cleans brakes with a recirculating solution to prevent airborne brake dust.*
- *Collects and recycles freon during air conditioning repair work.*
- *Uses cleanup methods that minimize absorbent wastes, including a "hydrophobic" mop that separates oil from coolant/water so both can be recycled.*

Education about environmental protection is important to Larry, so he also . . .

- *Holds weekly safety/idea-exchange meetings with employees.*
- *Tries to help other shops through his trade association.*
- *Encourages customers to keep their cars properly smogged and tuned to reduce emissions and hazardous fluid losses. He even developed a customer newsletter to help do this more effectively.*

Benefits from Larry's efforts include becoming a "dry" shop (no wastewater permit) and reduced hazardous materials/waste storage fees and disposal costs. Additionally, recycling of cans, bottles, cardboard, and paper has resulted in a 1/3 reduction of solid waste disposal costs. Most importantly, Larry's customers express their appreciation for his shop's concern for environmental protection.

For more information call
Santa Clara County Pollution Prevention Program
408-441-1195

Introduction

This chapter outlines the elements of a basic waste minimization program and the process for conducting a thorough facility waste reduction assessment. Forms and worksheets provided to assist in the assessment process are referred to in the corresponding text. The information included is comprehensive to provide detail for those who want it, and may not suit the needs of all businesses. Use this chapter as a guide only. Pick and choose only the ideas and "tools" applicable to your business needs (page 3-5 suggests an alternate process for very small businesses). Regardless of your approach, this chapter can help you begin and maintain a waste minimization program that will reduce waste management costs and liabilities while improving worker and community environments.

Figure 1 on the following page outlines the topics discussed in this chapter for easy reference.

Initiating a Waste Minimization Program

Ensure Both Management & Employee Commitment

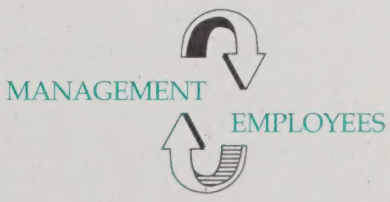
Success at waste minimization depends on commitment and involvement by both management and employees. A lack of commitment by either will result in an ineffective program.

Management support is crucial to acceptance of waste minimization by employees. To demonstrate commitment, it is important that upper management – the shop owner, president, or other appropriate person:

- **Establish waste minimization as an official policy and priority company goal**
- **Actively participate in all phases of company waste reduction efforts**

Involving employees is critical as well, as they are ultimately responsible for the successful implementation of the waste minimization program. Once management is dedicated, it can foster commitment and involve employees in a number of ways:

- **Establish effective communication between managers and employees**



Develop two-way lines of communication which promote the exchange of information between management and employees. Employees need to be well-informed to effectively implement company goals and policies. They also must feel confident that management is open to their suggestions. (Those doing the work are familiar with the processes generating waste and are good sources of ideas on how to reduce it.)

Figure 1. Waste Minimization Program Steps

PAGE	STEPS	FORMS*
		F=Form WS=Worksheet
3-1	**Initiate a Program** • Ensure Both Management & Employee Commitment • Designate Waste Minimization Personnel • Set Goals	
3-4	**Organize Your Business with Waste Management in Mind** • Strategies to Reduce Waste Before it Enters the Business	
3-5	**Conduct a Waste Reduction Assessment**	
3-5	(1) Preliminary Review	F-A; WS-1
3-6	(2) Facility Walkthrough	F-A; F-B
3-7	(3) Identification of Waste Reduction Alternatives	F-C
3-7	(4) Evaluate & Prioritize Alternatives:	
3-7	a. Initial Screening	F-C
3-7	b. Evaluate Remaining Alternatives	
	• Wastestream Priority	WS-2
	• General Potential	WS-3
	• Technical & Economic Feasibility	WS-4,5
3-9	c. Final Selection & Prioritization	F-C
	Select new assessment targets and reevaluate previous options	
3-9	**Implement Selected Waste Reduction Options** • Develop and Implement an Action Plan • Evaluate Results	
3-10	**Adapt Your Program to Changing Needs** • Periodic Review • Ongoing Commitment	
	Changes "trigger" reassessment	

*Forms/worksheets provided to assist in assessment process are located at end of chapter (pg. 3-12).

- **Educate employees about the potential benefits to themselves, the business, the community, and the environment that will result from their efforts**

- **Create incentives to encourage the development of waste minimization ideas** Consider using recognition awards, profit sharing, bonuses based on money saved, prizes, etc. as rewards for successful ideas.

Designate Waste Minimization Personnel

Designate personnel responsible for leading waste minimization efforts. In small shops, the owner or manager may be the only person available or needed. Larger businesses should choose a "team" of employees. Team size will depend upon company size, complexity, and variety of operations. More important than size, is to ensure input from all perspectives by involving employees familiar with each aspect of the business. If necessary, outside consultation can supplement in-house capabilities to spot routine problems which employees may overlook.

Waste minimization personnel will be responsible for:

a. Setting waste reduction and program goals
b. Communicating effectively with employees and management
c. Conducting a waste reduction assessment
d. Recommending waste reduction alternatives
e. Developing and overseeing their implementation
f. Evaluating progress and initiating modifications or new strategies as appropriate.

Waste minimization "teams" should also provide for:

- **Leadership:** Someone in charge and accountable for the program
- **Regular Communication:** Hold regularly scheduled meetings to discuss progress and share new information or ideas
- **Recordkeeping:** Record meetings, discussions, and progress
- **Consensus:** Cooperative decision-making makes waste reduction work
- **Longevity:** Maintain the waste minimization team to continue progress

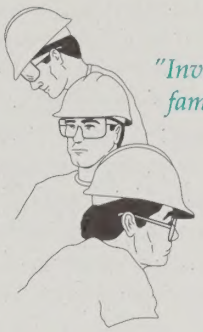
Set Goals

Management and waste minimization personnel should define goals for (1) how the program will work, and (2) what it is to accomplish. In addition to setting specific waste reduction targets, other desirable goals may include improving employee or community relations, improving worker health and safety, and meeting regulatory requirements.

Goals should be:

- **Acceptable** to those who will work to achieve them
- **Flexible** to adapt to changing requirements
- **Measurable** over time
- **Motivational** to encourage participation
- **Compatible** with the overall company goals
- **Understandable** by everyone
- **Achievable** with a reasonable amount of effort

⬅ Chapter One describes benefits of waste minimization.



"Involve employees familiar with each aspect of the business"

⬅ Assessment Responsibilities

Characteristics Necessary for a Successful Program

- *Increased attention to hazardous chemicals usage*
- *Willingness to modify work patterns*
- *Knowledge of potential options*
- *Willingness to innovate and experiment*
- *Resources to implement options*
- *Motivation to follow through and learn*

Awards Program

In 1993 the first *Susanne Wilson Environmental Achievement Awards* were presented to publicly recognize facilities in Santa Clara County that have significantly reduced hazardous waste generation. There are separate categories for large, small, and medium-sized facilities, and one for non-profit/public education programs. The awards are presented every two years. For information call the Santa Clara County Pollution Prevention Program at (408) 441-1195.

Good Press = Good Business

An automotive shop in Nevada County has received increasing attention because of its environmentally progressive activities. The owner has been the subject of numerous newspaper and magazine articles (local, state, and national) and is a popular speaker at government and business seminars. His business has earned the good will of the community, and environmentally conscious customers seek out the shop.

Studies show training alone

- *can improve the application efficiency of paint spray operators by 40%*
- *can reduce dragout in metal plating operations by 40%*

Organizing Your Business with Waste Management in Mind

Is your business organized with waste management in mind? Sound business procedures and policies are important to any successful company. Developing or modifying business procedures to avoid unnecessary waste management costs and take advantage of your environmental efforts will increase their effectiveness.

By incorporating the suggestions below into your general business procedures – marketing, accounting, recordkeeping, personnel policies, and operations – you will increase your firm's ability to carry out an effective waste minimization program to reduce hazardous waste generation and associated costs.

☑ **Marketing Strategies:** The current wide-spread public support for pollution prevention is likely to continue. Companies which directly serve the public should take advantage of this fact in their marketing strategies. Promote your company's environmental compliance and waste reduction efforts, and educate your customers about any waste management charges on their bill. The local community (your customer base) will appreciate your concern about *their* environment and may subsequently support *your* business. Take advantage of good press and any "pollution prevention" awards programs available in your area. In a tough economic climate, using and promoting sound environmental practices can give you a competitive edge over businesses providing similar services or products.

☑ **Financial Accounting:** It is essential to fully identify the costs associated with the hazardous materials and wastes you use or produce. Attribute these expenses to the specific operations creating them (rather than counting as "overhead"). Then the true cost and profit of specific operations will be accurately reflected. Hazardous materials and waste management expenses may include training, transportation, storage and handling, safety equipment, insurance, compliance paperwork and fees, management overhead, treatment, disposal, and long-term liability, etc. (Worksheet 1 provides more detail outlining waste management costs.)

☑ **Recordkeeping:** Yes, recordkeeping is time-consuming. But accurate records allow you to make reliable cost/profit calculations (as described above), and thus informed waste management and reduction decisions. Additionally, these records can assist you in documenting your efforts for compliance purposes. Maintain records on the (1) type and quantity of hazardous materials purchased and used, (2) type, quantity, and source of hazardous wastes being generated, and (3) associated hazardous materials/waste management costs.

☑ **Personnel Policies:** Consider proper hazardous materials/waste management and minimization job responsibilities subject to review. Cite related accomplishments or poor performance in employee evaluations. Both managers responsible for allocating resources and line workers should understand waste management requirements and liabilities. Provide ample opportunity for ongoing training, and introduce all new employees to the company's hazardous waste minimization policies. With adequate training, workers will handle hazardous materials and wastes properly, reducing material losses, accidents, and exposures while supporting waste reduction efforts. The ability of employees to carry out your waste management and reduction program is key to its success.

Operations Procedures: Good "housekeeping" and operating practices should be the initial focus of a waste minimization program. These practices include measures such as careful purchasing, preventive maintenance, and use of efficient cleanup methods. Often inexpensive and easy to implement, such practices minimize material losses and prevent unnecessary hazardous waste generation while maintaining productivity. Incorporate good housekeeping and operating measures as routine procedures prior to considering more complex or expensive waste reduction alternatives. The assessment process outlined below can help identify opportunities to implement practices which aren't already part of your normal operating procedures.

Conducting a Waste Reduction Assessment

A waste reduction assessment (sometimes called an "audit") is the process used to identify opportunities for waste reduction. It is the foundation of a waste minimization program, from which all efforts progress.

NOTE: If you are required to conduct a waste minimization assessment under SB14 (see page 2-4) or by a local agency, be sure to follow the procedures and reporting requirements specified by that program. Use the following information only as supplemental guidance.

The following steps are part of the waste reduction assessment process:

(1) Perform a preliminary review of current waste generation patterns and management practices
(2) Conduct a facility walkthrough
(3) Identify waste reduction opportunities
(4) Evaluate and prioritize waste reduction alternatives

An assessment can be as simple or as extensive as resources, time, and commitment allow. (A survey and visual walkthrough may be all that is needed for some facilities, while others may require technical, chemical, and/or engineering analysis.) The point is to use a systematic approach to ensure that all sources of waste generation and opportunities for their reduction are identified and evaluated.

(1) Perform a Preliminary Review

(Form A, Worksheet 1)

The purpose of the preliminary review is to identify and characterize the sources, types, and amounts of hazardous waste generated; current waste management practices; and associated expenses using available records and information. The background information collected will help identify priorities and opportunities for waste reduction. It also provides essential baseline data for later evaluation of program effectiveness. The facility walkthrough will then supplement this information and spot problems or opportunities.

Waste minimization personnel should compile information on all wastestreams generated at the facility. (But if time or money is very tight, focusing on just the major wastestreams is still a good start. See page 3-8 and Worksheet 2 for guidance on prioritizing wastestreams.)

The review should include:

- major solid/liquid hazardous wastes
- air emissions
- wastewater discharges
- and less obvious sources: obsolete/out-dated stock, overspray, evaporative waste, maintenance and cleanup waste, spoiled production runs, spills/container leaks, system leaks (pipes, joints, etc.).

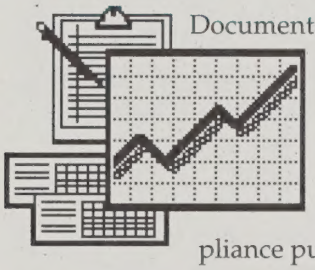
Very Small Business Option

If you can not conduct a thorough assessment because of very limited time and resources, you can still accomplish much by:

(1) reviewing the waste minimization suggestions outlined in Chapter 4, and

(2) conducting a facility walkthrough (modify the procedures outlined on page 3-6 and the Walkthrough Report to fit your needs).

About Documentation . . .



Documentation can be very important for future reference and compliance purposes.

Be sure to document all aspects of the waste reduction assessment process (Steps 1 – 4) and results.

The forms provided at the end of this chapter can help you do this.

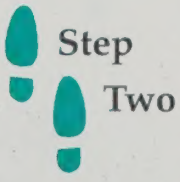
Step One

"Multimedia" Efforts

To get maximum returns for your waste reduction efforts, consider looking at your solid waste generation, water use, and energy use as well. They may be a goldmine of potential savings! (See side panels in Appendix A for related resources.)

Sources of Information

Material Safety Data Sheets (MSDS)
Product/Vendor Information
Lab Analyses (private, regulators, your waste management firm)
Regulated substances lists (pg. 2-14)
Monitoring/testing records (private, regulators, your waste management firm)
Hazardous Materials Inventory (from your HazMat permit)
Hazardous waste manifests
Biennial Reports
Environmental/regulatory permits
SARA 313 release reports
Transporter or waste management firm records and/or contracts
Inventory & purchasing records
Hazardous waste manifests, bills of lading, receipts
Annual/quarterly hazardous waste disposal tax reports
Process flow diagrams
Piping/instrumentation diagrams
Operating manuals, procedures, process descriptions
Operator data logs
Production schedules & records
Equipment lists, specs, data sheets
Previous regulatory inspection or violation reports
Water/sewer rates & records
Facility layouts or diagrams (may include location of equipment, sewers, piping, hazardous materials & waste collection, storage, & treatment areas, etc.)
Accounting reports



One purpose of the walkthrough is to look at your operation with "new" eyes . . .

To see it in terms of sources of waste generation, as opposed to product manufacturing or services

For each wastestream, use the **Waste Profile Form** (Form A) and identify to the extent practicable the waste's:

(1) Physical and chemical characteristics,
(2) Sources and quantity of generation, and
(3) Current waste management practices

(Potential sources of this information are listed in the side panel to the left.)

Then use the **Waste Management Cost Worksheet** (WS-1) to determine the current costs of managing each wastestream.

By using these forms, or your own system if you prefer, the information will already be compiled in an organized and consistent manner. Setting priorities and making comparisons will then be easier.

In addition to wastestream details, try to include process descriptions with diagrams showing pertinent aspects of production and waste generation. The more familiarity with these aspects, the better prepared waste minimization personnel will be for the facility walkthrough.

(2) Conduct a Facility Walkthrough

(Form B, Form A)

The facility walkthrough should supplement the preliminary review by verifying, correcting, and completing the compiled information. Additionally, observation of the actual waste generating processes should help identify problems areas and potential waste reduction opportunities.

Follow the "life-cycle" of your operations, from delivery of raw materials to shipping of final products or waste. Because of their familiarity with facility operations, it is essential that waste minimization personnel try to look *objectively* during the walkthrough in order to be able to spot potential problems and opportunities.

Before the walkthrough, become familiar with the general types of waste minimization methods available (discussed in Chapter One) and specific waste reduction practices (outlined in Chapter Four). This preparation may help in identifying opportunities to incorporate some of these ideas.

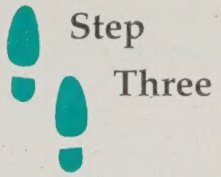
In addition, it's a good idea to prepare an agenda to follow, and to observe operations at different times if shift changes or other changes in production occur during the course of a day.

During the walkthrough:

(1) use the Walkthrough Report (Form B) provided to guide observations;
(2) complete information missing from the preliminary review (Waste Profile, Form A);
(3) record observations, sketch simple diagrams, and/or photograph operations;
(4) talk with employees to clarify actual operational procedures/responsibilities;
(5) look for and note:
- current use/neglect of good housekeeping and operating practices
- indications of good/poor departmental coordination/communication;
- potential waste reduction opportunities.

After the walkthrough, compare notes to resolve any inconsistencies and complete information gaps from the Waste Profile and Walkthrough Report.

(3) Identify Waste Reduction Opportunities
(Form C)



The walkthrough should have highlighted various waste reduction opportunities. A brainstorming session can be an effective means to identify those opportunities and generate other ideas. List all possible opportunities regardless of technical or economic feasibility, and encourage innovative ideas. Try not to prejudge ideas – they will be evaluated later.

Additional sources of ideas include:

- Chapter 4 and the resources listed in Appendix A
- Equipment venders, trade associations, and members of your industry
- Articles in technical magazines, trade journals, and government reports
- Consultants experienced in waste minimization for your industry

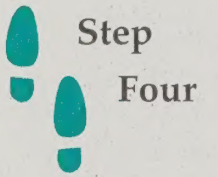
Emphasize good operating and "housekeeping" practices and other *source reduction* measures that prevent waste from being generated in the first place. These measures generally do the most to reduce costs and regulatory burdens.

Make a complete list of the waste reduction opportunities identified and, for each alternative, fill in Part I of the Waste Reduction Option Summary (Form C).

Identified Waste Reduction Opportunities

1. _____	11. _____
2. _____	12. _____
3. _____	13. _____
4. _____	14. _____
5. _____	15. _____
6. _____	16. _____
7. _____	17. _____
8. _____	18. _____
9. _____	19. _____
10. _____	20. _____

(4) Evaluate and Prioritize Waste Reduction Alternatives
(Form C, Worksheets 2, 3, 4, 5)



The final and most challenging phase of assessment involves evaluating and prioritizing waste reduction alternatives for immediate, short-term, and long-term attention.

The number of alternatives selected and their order of priority will depend on the resources available and other priorities of your firm. A clear understanding of the time and money that management has allocated for implementation of alternatives is needed in order to make appropriate recommendations.

⬅ Initial "Screening"

Screen your list of options to determine which should be evaluated. It may become obvious that some options should be deleted from further consideration right now. (e.g. You *absolutely* cannot afford large capital expenses or disruption of service/production right now; you *know* certain options would meet extreme resistance; etc.) Don't be too hasty. Often initially expensive options *will* save money and other obstacles may be overcome with a little thought and effort. Note why you chose not to consider any option in Part II of its Summary (Form C) and save this information for future reference.

⬅ Appendix C lists sources of financial assistance.

You also can set some initial priorities. Some waste minimization options are obviously easier and less expensive to implement than others. For example, planning to eliminate waste before it enters your business and other good housekeeping measures that require little, if any, capital expenditure, technical resources, or disruption of operations should be readily approved and implemented as soon as practical. Consider these options initial priorities and check the "Immediate" Priority Rating in Part II of its Summary (Form C).

⬅ Good housekeeping and operating practices are outlined in Chapter 4.

⬅ Evaluate Remaining Alternatives

After this initial screening, prioritize the remaining alternatives using the following evaluation suggestions and forms. Some evaluation criteria may be more important than others to your firm. Take into account the unique concerns of your firm by giving more weight to the criteria which reflect those concerns.

Evaluate Remaining Alternatives, cont. ➡

Keep In Mind

As you evaluate waste reduction alternatives, keep in mind that implementation of high priority source reduction options (e.g. good housekeeping and operating practices) may affect your analyses of other options. For example, sometimes good housekeeping can reduce a wastestream by more than 50%. Other alternatives affecting the same wastestream must then look at the potential for reduction after the 50%+ reduction achieved by implementing good housekeeping. Try to get a reasonable estimate of the source reduction achievable by high priority options prior to evaluating others. Or, implement them first so that you will know the actual level of waste generation that should be used for comparison.

In the case of equipment related options or process changes, try to arrange visits of existing installations through equipment vendors and industry contacts. Operator's comments are especially important and should be compared with vendor claims or bench-scale experiment results. Some vendors will even install equipment on a trial basis.

Wastestream Evaluation: One criterion which can be used in prioritizing alternatives is whether a waste reduction option addresses a high, medium, or low priority wastestream. Prioritizing wastestreams can also focus efforts (during walkthrough and subsequent evaluation) if limited resources prevent addressing all wastes at once. Use Worksheet 2 as a guide to help you determine which wastestream(s) should be assigned high, medium, or low priority:

(1) Copy Wastestream Priority Worksheet (WS-2) and answer the questions for each wastestream you generate.

(2) Refer to the Waste Profile (Form A) and Waste Management Cost Worksheet (WS-1) completed previously to help you answer the questions.

(3) Follow the instructions at the bottom of the worksheet to weight criteria and determine a final "score." (Be sure to weight the same criteria for each wastestream evaluated.)

Compare the "scores" of each wastestream evaluated. In general, the more ✔s in the shaded area (the higher the "score"), the more benefit can be gained by reducing the wastestream. Based on this evaluation, group wastestreams into categories of (1) high, (2) medium, and (3) low priority.

Evaluating Waste Reduction Alternatives: Although cost-effectiveness and technical feasibility are often the major factors affecting waste reduction decisions, many other issues can impact your decisions as well. Evaluation Worksheet 3 lists questions which will heighten your awareness of these issues and help you determine the initial suitability of an alternative.

(1) Copy Worksheet 3 and answer the questions for each waste reduction option being evaluated.

(2) Based on your answers, does the option appear to be a potential candidate for implementation?

(3) If yes, proceed with the technical and economic evaluations as necessary. If no, record why in Part II of the Summary (Form C).

Depending on your resources and the particular option under consideration, economic and technical evaluations can be fairly brief or in-depth. Be thorough when considering alternatives requiring significant expenditures and technical modifications.

Technical Feasibility: Use the questions on the Technical Feasibility Worksheet (WS-4) to help you identify serious issues which could prevent you from implementing a particular option. Based on your answers, give each option a technical feasibility rating of "good," "average," or "poor."

Economic Feasibility: Reducing or avoiding present and future costs associated with waste treatment, storage, transportation, and disposal is a major goal of any waste minimization program. Sometimes ignored in the past, these costs continue to rise and are critical elements of the economic evaluation.

Waste reduction projects often pay for themselves through direct and indirect long-term cost savings. In cases where the option itself introduces new waste management costs, more extensive analysis may be required to determine whether there is a net savings or expense.

Use the Economic Feasibility Worksheet (WS-5) and Waste Management Cost Worksheets (WS-1) to determine the cost-effectiveness of each waste reduction option being evaluated.

Even if an option is not cost effective, you may still consider implementation if it will help you meet regulatory requirements.

Record your technical and economic feasibility ratings in Part II of the Summary (Form C). Based on the results of all three parts (general potential, economic feasibility, technical feasibility), group alternatives for (1) immediate, (2) short-term and (3) long-term action, and prioritize within each category. Make a listing of all options in their final order of priority.

Complete Part II of the Waste Reduction Option Summary (Form C) to record your findings. If applicable, note why any alternative was considered not feasible.

Look over the evaluations and make any necessary corrections. Provide all affected employees (or departments in larger firms) with the final priority listing and Summary forms for review and comment. Make appropriate changes to ensure the practicality and acceptance of selected options, and share the results with all employees.

Implementing Selected Waste Reduction Options

Develop and Implement an Action Plan

Develop an action plan and schedule which the company can follow in implementing its waste reduction program. Establish an overall timeframe for implementation of immediate, short-term, and long-term priority options.

For each targeted option:

- Identify steps or phases for implementation
- Identify required resources and how to get them
- Identify tasks and personnel assignments
- Estimate construction periods or production downtime (if applicable)
- Set target dates for phase implementation and final completion

Complex options involving new equipment will follow the same phases as other capital improvement projects: (1) planning, (2) design, (3) procurement, (4) construction, and (5) start-up. Less complex options may not need to be phased at all. And some projects may need additional research, development, or reworking if they do not meet original performance expectations.

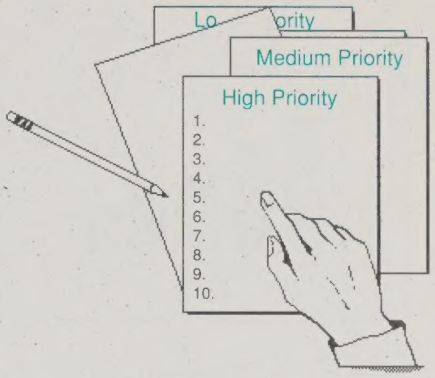
Be sure to involve your employees in the implementation process. Share the action plan and schedule with all employees and invite feedback. Prepare and train employees who will be involved with implementation of targeted waste reduction measures and address their concerns.

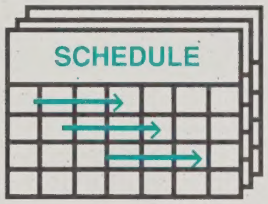
Waste minimization efforts may require both behavioral and attitudinal changes on the part of employees. During the adjustment period, support and encourage employee efforts to ensure new practices have a chance to succeed.

Evaluate Results

Evaluate your program to determine the effectiveness of implemented measures and plan future efforts. Success can be measured for either (1) each waste reduction option implemented, or (2) the overall waste reduction program.

⬅ Final Selection & Prioritization





Proceed with Caution

For those options which have the potential to affect production and/or product or service quality, you should implement one measure at a time and then observe the results. This way, if any negative affects are observed, you can trace the cause and make necessary modifications. If more than one measure is implemented at a time, you may not be able to directly attribute a particular effect to a specific change.

Did waste generation go down?

To determine the effectiveness of a specific option, after its implementation:

(1) Copy and complete a new Waste Profile (Form A) and Waste Management Cost Worksheet (WS-1) for the affected wastestream(s).

(2) Compare your answers with the Form A and Worksheet 1 that were originally completed during the preliminary review:
- Has waste generation gone down?
- Have waste management costs gone down?
- Have other costs gone down or have other benefits been realized?

(3) Review your answers to Evaluation Worksheet 3. Are your actual results the same as anticipated ? (i.e. Did production go up? go down?, Was quality affected? etc.)

(4) Summarize and record your findings in Part III of the Waste Reduction Option Summary (Form C).

If more than one waste reduction measure affects the same wastestream(s), it can be difficult to determine the effectiveness of each individual measure. However, using the same procedure (comparing "before" and "after" results of the waste profile and waste management costs), you can get an indication of the overall effectiveness of your combined efforts.

Some indirect benefits of reduced hazardous materials use and waste generation (e.g. reduced worker injury/exposure and related worker's compensation fees, reduced pollution liability insurance, etc.) will not be evident for a longer period of time. To determine if your program has resulted in these long-term benefits, you will need to wait about a year, or more, and then compare past and current records. Be sure to let your insurance provider(s) know of decreased hazardous materials/waste activity and any improvements in worker injury rates in order to lower your premiums.

Organize your records for easy reference in the future . . .

Again, keep good records of your results. This information is necessary background for future decisions regarding waste management, which may be made by personnel not familiar with the original assessment.

Adapting Your Program To Changing Needs

Periodic Review

The waste assessment process is an important first step toward waste minimization. Performing a thorough initial assessment results in the selection of economically and technically feasible waste reduction measures. However, as production processes change, waste management costs continue to rise, and new technology becomes available, it will be necessary to review and repeat the assessment process. Periodic review will identify new options and any previously disregarded options which have become feasible. Implementing them will enable your business to maintain a competitive edge by keeping waste management costs down to a minimum.

Reassessment "Triggers" ➡

An assessment (at least a partial or focused one) should be done whenever:

- Raw material or product requirements change
- Hazardous material or waste management costs increase
- New technologies or new regulations are introduced
- A hazardous material/waste related incident (release, exposure, etc.) occurs

Before repeating the waste assessment process, decide if the process used needs any changes to improve its effectiveness. Use the following questions to highlight areas needing improvement:

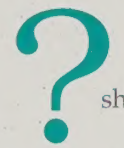
- Did the waste assessment meet its intended purpose – to reduce waste generation?
- Does waste reduction remain a priority for management and employees?
- Did the assessment identify opportunities to improve production efficiency and waste management approaches and to reduce costs?
- Did the assessment provide for good communication between employees and management?
- Was the person(s) or team conducting the assessment adequate, or could outside experts or additional information and workers improve the assessment?
- Are there procedures that should be changed or added to avoid any experienced problems?
- Were the information-gathering techniques effective and appropriate?

Again, seek input from employees and incorporate their ideas. Just as other aspects of a business are dynamic, a waste reduction program should be too.

Ongoing Commitment

For a program to be truly effective, waste minimization "philosophy" and practices must become an integral part of operations throughout a business. By employing the strategies discussed in this chapter, your business should be well on its way to achieving a successful program and all the subsequent benefits.

To ensure these benefits continue, it is essential to maintain the commitment of management, existing employees, and new employees to your waste minimization program. The strategies used to develop that commitment initially should be continued and reinforced. Resolve personnel-related difficulties immediately before they become "roadblocks," and continue to look for new opportunities.



Was the assessment process effective? Or should changes be made next time?

Keep up waste minimization efforts for continuing benefits!

FORMS & WORKSHEETS

The following forms/worksheets* are included to provide a structure for collecting and organizing the information needed to evaluate waste reduction opportunities. Additionally, they can be a record of your waste minimization efforts for compliance purposes.

Adapt the forms to your needs, or use other forms you find more appropriate. They are intended as a guideline only, to help businesses identify issues and information pertinent to hazardous waste management decisions.

Each form and worksheet is referenced to the primary corresponding discussion in Chapter Three.

Included:

- Form A – Waste Profile
- Form B – Walkthrough Report
- Form C – Waste Reduction Option Summary
- Worksheet 1 – Hazardous Waste Management Costs
- Worksheet 2 – Wastestream Priority
- Worksheet 3 – General Potential
- Worksheet 4 – Technical Feasibility
- Worksheet 5 – Economic Feasibility

**If you are required to conduct a waste minimization assessment by the state (SB14) or a local agency, be sure to use the format and/or forms specified by that program.*

Waste Profile (Form A)

(Refer to pages 3-5 to 3-6)

Wastestream: _____ **Date:** _____

(1) Physical/Chemical Characteristics

- What's in the waste? List all known components (include concentration/"strength"):

✔ if Hazardous		% contribution to the waste	Hazard Type*
❑	_____	_____	_____
❑	_____	_____	_____
❑	_____	_____	_____
❑	_____	_____	_____
❑	_____	_____	_____
❑	_____	_____	_____

*(corrosive, toxic, flammable, reactive)

- Physical State: ❑ Solid ❑ Liquid ❑ Gas ❑ Other/Mix _____
- Primary Hazard(s): ❑ Corrosive ❑ Toxic ❑ Flammable ❑ Reactive
- How hazardous is the wastestream? ❑ High ❑ Medium ❑ Low

(2) Sources of Waste Generation

- What process(es) or operation(s) generate the waste?

_____

_____

- How does the hazardous component(s) enter the wastestream? _____

_____

_____

- What percentage is it of your total waste generation? _____ %

[1]Use consistent terms for all wastestreams, e.g. all solids in lbs/month or tons/year, etc.

- How much is produced (quantity/time)?[1]
- ❑ Constant flow ❑ Intermittent
- Significant Variations? ❑ YES ❑ NO

(3) Waste Management Practices

- What handling and/or storage occurs?

Handling: _____

Storage: _____ How Long: _____

- How is the waste managed? ✔ all that apply and describe:

On/Offsite (✔ appropriate box)

❑ ❑ Recycled/Reclaimed: _____

❑ ❑ Treated: _____

❑ ❑ Incinerated: _____

❑ ❑ Other: _____

- Is the waste (or residuals) ultimately:
  - ❑ Landfilled
  - ❑ Emitted to Air
  - ❑ Discharged to
    - ❑ Sanitary Sewer
    - ❑ Storm Drain/ Other Waterway
  - ❑ Other: _____

- Are there hazards/problems/long-term liabilities associated with current practices? ❑ YES ❑ NO

Describe: _____

_____

- Is waste minimization already being implemented for this wastestream? ❑ YES ❑ NO

Describe: _____

(over)

Waste Profile (Form A), cont.

(4) Waste Management Costs

- What are your costs to manage this wastestream? (Use Worksheet 1 to calculate.) $ /yr

(5) Waste Reduction Assessment & Implementation Results

- Wastestream Priority Assignment (from Worksheet 2) ❑ High ❑ Medium ❑ Low

Waste Reduction Alternatives Identified as Appropriate for this wastestream:	Implemented? (Yes/No)	Date	% Waste Reduction Achieved

Other Comments or Notes

Walkthrough Report (Form B)

(Refer to page 3-6)

Date: _____

Use this form to guide your observations during the walkthrough. Follow your operations from delivery of raw materials, through production/service operations, to final waste management methods. Your initial impressions can provide vital clues about how your wastes are generated, and how they might be controlled.

Verify Previously Collected Information

Verify the information collected during the preliminary review and complete the waste profiles (Form A). Look for the following in particular:

- ❑ Wastestream characteristics and sources of generation
  (Get employee comments about the sources of waste in the facility.)
- ❑ Waste management practices (handling, storage, "disposal")
  (Describe any associated problems or potential hazards.)
- ❑ Waste minimization practices in place (including good "housekeeping")
  (Do they appear to be effective?)

Look for Indications of Poor Housekeeping and/or Planning

Y	N	
❑	❑	Cluttered walkways and storage areas
❑	❑	Unswept or stained floors
❑	❑	Uncovered/open containers
❑	❑	Drums stacked improperly, shelving too small to properly handle inventory
❑	❑	Stockpiling of empty drums/containers
❑	❑	Lack of or illegible container labels *(For those which are there, do they describe contents and hazards? If "waste," do they have a "hazardous waste" label?)*
❑	❑	Out-dated stock or materials no longer in use are still in storage
❑	❑	Large quantities of stock on hand of items not used often
❑	❑	History of spills, leaks, accidents or fires

Look for Indications of Material Losses and/or "Hidden" Sources of Waste Generation

Y	N	
❑	❑	Noticeable spills or leaking containers
❑	❑	Discoloration or corrosion on walls, work surfaces, ceilings, floors, or pipes *(May indicate system leaks or poorly maintained equipment.)*

Walkthrough Report (Form B), cont.

Look for Indications of Material Losses and/or "Hidden" Waste Generation, cont.

Y N

- ❑ ❑ Visible smoke, dirt, or fumes
- ❑ ❑ Strange odors or eye, nose, or throat irritation when first enter the workplace
- ❑ ❑ Dripping or running water, steam, evaporation, drag-out, etc.

Look for Necessary Safety Measures

Y N

- ❑ ❑ Hazard warning signs are posted and clearly visible
- ❑ ❑ Emergency equipment available and visible to ensure rapid response to fire, spill, or other incident
- ❑ ❑ Safety equipment in good condition and being used by employees
- ❑ ❑ MSDSs readily accessible

Look for Indications of Good/Poor Employee-Management Communication

Y N

- ❑ ❑ Supervisors are accessible to employees and encourage their participation
- ❑ ❑ Employees are satisfied with work environment
- ❑ ❑ Other:

NOTES

Opportunities for Waste Reduction:

Other Comments:

Waste Reduction Option Summary (Form C)

(Refer to pages 3-7 to 3-9)

Option: _____ **Date:** _____

Wastestream(s) Affected: _____

Use this form to summarize your findings during evaluation of alternative waste reduction options. A form should be filled out for each specific measure (e.g. if you are considering material substitution for more than one material, fill out a form for each substitution).

PART I – To Be Completed Initially

- Type of Waste Reduction Measure:

❑ Source Reduction
- __ Good "housekeeping"/operating practices
- __ Other personnel/procedure-related change
- __ Equipment-related change
- __ Materials-related change

❑ Recycling/Reuse
- ❑ Onsite ❑ Offsite
- __ Materials reused for original purpose
- __ Materials reused for other purpose
- __ Material components reclaimed
- ❑ Waste Exchange with another company

- Detailed Description of Option: _____

_____

_____

_____

_____

- Objective/Anticipated Benefit(s): _____

_____

PART II – To Be Completed During Alternatives Evaluation Step

- Initial Screening (✔ the appropriate box):

❑ No Further Consideration: This option will not be considered further at this time.

Reason(s): _____

❑ Initial Priority: This option should be given immediate attention without further evaluation (i.e. It is a good housekeeping/operating practice that can be implemented with little/no cost or difficulty.). Skip to "Priority Rating" and ✔ "Immediate."

❑ Evaluate Further: Continue to perform evaluation using worksheets 3, 4, and 5.

It may be helpful to determine the following information prior to proceeding with evaluation worksheets 3, 4, and 5.

- Estimate the waste reduction achievable (if more than one type of waste is affected, estimate the reduction for each):

Wastestream: _____ Estimated Reduction: _____

Wastestream: _____ Estimated Reduction: _____

- List any new wastes which may be created and estimate the generation rate:

Wastestream: _____ Estimated Generation: _____

Wastestream: _____ Estimated Generation: _____

(over)

Waste Reduction Option Summary (Form C), cont.

PART II, cont.

- Evaluation Results: Fill in the results from worksheets 3, 4, and 5.

  General Potential (WS-3): ❑ Good ❑ Average ❑ Poor Continue to next step? ❑ Yes ❑ No

  Technical Feasibility (WS-4): ❑ Good ❑ Average ❑ Poor Continue to next step? ❑ Yes ❑ No

  Economic Feasibility (WS-5): ❑ Good ❑ Average ❑ Poor

  Annual Estimated Savings (WS-5, line 1): $_____/yr

  Payback Period (WS-5, line 5): _____yrs

- Project ❑ Accepted ❑ Rejected for implementation.

  Reason: _____

- Priority Rating: ❑ Immediate ❑ Short-term ❑ Long-term

- Estimated time required to implement: _____

PART III – To Be Completed After Implementation

- Actual time required to implement: _____

- Difficulties encountered during implementation: _____

  _____

  _____

- Effectiveness:

	Capital Costs[1]	Annual Savings[2]	Waste Reduction
Estimated:			
Actual:			

[1]line 4, Economic Feasibility Worksheet (WS-5) [2]line 1, Economic Feasibility Worksheet (WS-5)

- Other Comments:

Hazardous Waste Management Cost Worksheet (WS-1)

(Refer to pages 3-5 to 3-6)

Wastestream: _____ **Date:** _____

Use this worksheet to determine current or estimate future hazardous waste management costs. Copy the form as many times as needed.

Describe all costs or savings in $/yr:

- Offsite hazardous waste management costs: $ _____ /yr
  (recycling, treatment, incineration, disposal,etc.)
- Hazardous waste transportation costs: $ _____ /yr
- Regulatory fees, taxes, and permit costs: $ _____ /yr
  (consider all applicable agencies & permits, etc.)
- Operation & Maintenance
  (handling, storage, pretreatment, treatment, emergency response preparation, preventive maintenance costs, etc. related to this wastestream)
  - equipment, supplies, parts, etc. $ _____ /yr
  - utilities, water, overhead, etc. $ _____ /yr
  - labor to handle, store, treat, and/or track waste $ _____ /yr
  - sampling/monitoring (if applicable) $ _____ /yr
- Training: hazardous waste handling/emergencies $ _____ /yr
- *Paperwork: permits, reporting, recordkeeping $ _____ /yr
  (related to waste tracking, training, regulatory reports, etc.)
- *Liability: workers compensation/insurance premiums, potential cleanup, etc. + $ _____ /yr

Total Hazardous Waste Management Costs: = $ _____ /yr

If applicable, adjust the total cost by subtracting any revenue received from saleable byproducts of this wastestream: − $ _____ /yr

Adjusted Total Hazardous Waste Management Costs: = $ _____ /yr

*These costs may be more difficult to quantify. Use a "best-guess" if you must, or be consistent in leaving these items blank for all wastestreams evaluated.

Wastestream Priority Worksheet (WS–2)

(Refer to page 3-8)

Wastestream: _____ Date: _____

The following questions will help you prioritize your wastestreams for attention. Refer to the Waste Profile (Form A) to answer some of the questions. Copy a form for each wastestream being evaluated, and place a ✔ in the column which corresponds to your answer for each question:

	Yes	No	Not Sure
• Are waste reduction measures already being implemented for this wastestream?			
• Are any of the raw materials contributing to this wastestream			
– very expensive?			
– *highly* hazardous (i.e. *highly* toxic, flammable, corrosive, and/or reactive)?			
• Is the wastestream overall *highly* hazardous? (Refer to part one of Form A)			
• Does this wastestream account for 25% or more of your total hazardous waste generation?			
• Are your current costs to manage this wastestream very high? (Refer to Worksheet 1.)			
• Is this waste currently being disposed of to land? (i.e. Is *long-term* liability is associated with the disposal method?)			
• Do you experience frequent problems in handling, storing, treating, transporting, disposing or discharging this wastestream?			
• Are new regulations anticipated which will require modifications or increase your costs to manage this wastestream?			
• Are reasonable, effective reduction methods that could address this wastestream already known to be available?			

Evaluation:

If you answered "not sure" several times, you should do some more background research before continuing.

Review the questions above. Do any of them deal with issues of particular importance to your business? If so, and you would like to give added "weight" to that particular criterion, place an extra ✔ in the column which corresponds to your answer for that question. (Do this for all wastestreams being evaluated.)

Now look at your answers. The more ✔s in the *shaded* area, the more priority should be given to minimize the wastestream. Total the number of ✔s in the shaded area for each wastestream (include any "extra" ✔s you added to weight the importance of a particular criterion). Write your answer in the space provided.

Compare totals and group wastestreams into categories of (1) high, (2) medium, and (3) low priority. Use this information to help you prioritize your waste reduction efforts.

Total ✔s in Shaded Area: _____

Wastestream Priority Assignment:

- ❑ High
- ❑ Medium
- ❑ Low

General Potential Worksheet (WS-3)

(Refer to page 3-8)

Option: _____ **Date:** _____

Wastestream(s) Affected: _____

The following questions will help you to determine the general potential of alternative waste reduction options. Copy a form for each option being evaluated, and place a ✔ in the column which corresponds to your answer for each question:

	Yes	No	Not Sure
• Is this option high in the "Hazardous Waste Management Hierarchy" (source reduction or recycling? See page 1-5.)			
• Will this option impact waste generation by:			
– significantly reducing a hazardous wastestream?			
– reducing one of the wastestreams identified as being a high priority (see WS-2)?			
– shifting waste to a different form or media (e.g. from solid waste land disposal to wastewater discharge or air emission)?			
– producing any new hazardous wastes?			
• Will this option have a net environmental benefit? (e.g. Even if new or shifted waste/materials are introduced, there is less negative environmental impact than from the current process.)			
• Will this option require the use of new expensive and/or hazardous raw materials?			
• Will this option require additional utilities or labor?			
• Will this option improve product quality?			
• Will this option increase production capacity/rate?			
• Will this option (new equipment or process) be compatible with existing procedures, work flow, etc.?			
• Will this option improve worker, community, or environmental safety and health?			
• Will this option reduce regulatory fees and/or reporting requirements?			
• Will this option produce by-products which can be sold or reused?			

Evaluation:

If you answered with several "not sures," you should do some more background research before continuing.

Look at your answers to the questions above. The more ✔s in the *shaded* area, the more desirable characteristics of the waste reduction option, and the more likely it is a good choice for further study.

Look at the questions to which your answers are *not* in the shaded area. Do any of these issues indicate a poor chance of success with this option? (Not all issues are *critical* to the potential success of the waste reduction option.)

Make a preliminary judgement regarding the general potential of this option and decide if further evaluation should be continued. ✔ the appropriate boxes to the right.

General Potential:

- ❑ Good
- ❑ Average
- ❑ Poor

Continue with Economic and Technical Evaluations?

❑ Yes ❑ No

Technical Feasibility Worksheet (WS-4)

(Refer to page 3-8)

Option: _____ **Date:** _____

Wastestream(s) Affected: _____

The following questions will help you to determine if significant roadblocks exist to implementation of any particular waste reduction option. Copy a form for each option being evaluated, and place a ✔ in the column which corresponds to your answer for each question:

	Yes	No	Not Sure
• Will this option adversely affect product quality?			
• Is there an industrial precedent for this method/technology with a good track record, or convincing evidence it will work?			
• If applicable, will the vendor of this option:			
– provide ongoing assistance/service?			
– guarantee performance?			
• Can this option be easily serviced and maintained?			
• Is special expertise required to operate or maintain this option?			
• Are there significant physical facility limitations which would make implementing this option difficult (space, building code specifications, etc. – e.g.. certain types of equipment require a fire wall)?			
• Will this option require installment of additional utilities?			
• Will implementation of this option significantly disrupt production or service?			
• Are planning approval or other permits needed to install utilities or modify your building or site?			
• Will this option require any new/additional regulatory permits? (for hazardous waste treatment, Hazmat, air district approval, POTW discharge, etc.)			
• Could this option negatively impact worker, community, or environmental safety and health?			

Evaluation:

If you answered with several "not sures," you should do some more background research before continuing.

Look at your answers to the questions above. ✔s in the *shaded* area indicate that a feasibility problem may exist. Do any of these issues represent a "roadblock" which could make implementation of this option difficult or impossible?

Make a judgement regarding the technical feasibility of this option and decide if further evaluation should be continued. ✔ the appropriate boxes to the right.

Technical Feasibility:

- ❑ Good
- ❑ Average
- ❑ Poor

Continue with Economic Evaluation?

❑ Yes ❑ No

Economic Feasibility Worksheet (WS-5)

(Refer to page 3-8)

Option: _____ Date: _____

Wastestream(s) Affected: _____

Use this worksheet and the Hazardous Waste Management Cost Worksheet (WS–1) to determine the net savings or costs of alternative waste reduction options. Copy the form as many times as needed.

Determining Estimated Annual Savings

Itemization of Costs/Savings	Current System ($/Year)	-	New System* ($/Year)	=	Estimated Savings** ($/Year)
Waste Management Costs (use WS-1) (for all wastes affected and any new wastes created)					
Raw Materials, Utilities, Labor Costs, etc. (related to general operations, not waste management, which were accounted for on WS-1)					
†Other Costs/Savings					
Total Annual Amounts					1. _____

*Base estimates on current level of production (use a negative "-" number to indicate a savings only, i.e. no cost)
**(a negative "-" result in this column indicates a net cost††)

†Potential savings related to reduced hazardous materials and waste at your facility which may be difficult to quantify but deserve consideration include:

- Reduced employee injury/illness and related workers compensation insurance premiums
- Reduced requirements and costs for worker health and safety protection and emergency preparation
- Reduced pollution liability insurance premiums
- Avoided legal fines and cleanup costs

Determining Payback Period

Capital Costs:

- Estimated one-time capital expenses for additional land, construction, or equipment: 2. $_____
  (e.g. training, lost production time, building permits, project engineering, construction, equipment installation, forgone interest rates, etc.
- If applicable, adjust for revenue from the sale of equipment and/or supplies no longer needed, depreciation, tax rebates, etc.: – 3. $_____

Net Capital Costs: 4. $_____

Payback Period = $\frac{\text{Net Capital Cost}}{\text{Estimated Annual Savings}^{††}}$

= $\frac{\text{line 4}}{\text{line 1}}$

5. = _____ years

††If there is no annual savings (i.e. new system has a net cost), there is no payback period. Such options may still be implemented if they serve another purpose, such as compliance.

✔ the box which best describes this option's

Economic Feasibility:

- ❑ Good
- ❑ Average
- ❑ Poor

Other Information Pertinent to Your Evaluation:

CHAPTER 4

Specific Waste Reduction Practices

Case Study: Metal Plating

P.K. Selective Metal Plating Inc., a Santa Clara metal finisher and graphic anodizer, modified its operations in order to meet local wastewater discharge limits. The changes made benefited the company in other ways as well:

- *Several low-cost alterations to rinse processes reduced water use on affected production lines by about 40% – use of (1) a slower flow rate, (2) a hose rinse (turns on/off) instead of a constant fast flow, and (3) a "reactive rinsing" system (rinse following an alkaline cleaning bath is reused as influent water to a rinse following an acid cleaning bath).*
- *Installation of an ion exchange system (isolates and removes heavy metals from the rinse solution, then filters and recirculates the water back to the original rinse tank) helped the company meet discharge limits and saved another 500-600 gallons of water per day.*
- *Installation of an efficient anodizing system, utilizing a "hydromiser" chilling unit, reduced hazardous material input while producing a higher quality product. Significant energy savings, reduced material costs, and increased production capacity essentially paid for the $250,000 investment in about a year.*

P.K. has demonstrated that both business and the environment benefit from waste reduction efforts. Changes made resulted in compliance with discharge limits, a 30% reduction in water use and discharges, decreased energy costs, improved quality, and a doubling of production capacity!

For more information call
Santa Clara County Pollution Prevention Program
(408) 441-1195

Introduction

In addition to the general business strategies introduced in the previous chapter (marketing, accounting, recordkeeping, personnel policies), many specific procedures can be implemented in your daily operation and maintenance to increase efficiency in the use of hazardous materials and significantly reduce hazardous waste generation.

This chapter makes some specific waste reduction suggestions, and is divided into two parts:

(1) Good Housekeeping and Operating Practices Page 4-1
(Procedures which generally apply to all industries.)

(2) Industry-specific Practices Page 4-8
(Waste reduction for specific industrial processes.)

Many of the measures suggested demonstrate that waste reduction does not have to be expensive or "high-tech." Companies can make major strides in reducing waste by implementing simple improvements.

At the very least, these suggestions serve to heighten awareness of the many opportunities available to reduce waste generation and can be a starting point for your own ideas.

Good Housekeeping & Operating Practices

The objective of good "housekeeping" and operating practices is to minimize material losses and prevent unnecessary hazardous waste generation through routine procedures.

Good housekeeping practices, like in a home, are things which can be done to maintain cleanliness and prevent "messes," spills, or accidents. Good operating practices include other simple steps that minimize waste generation. All industries can benefit from these practices.

Review the following pages to identify good housekeeping and operating practices which have not already been implemented in your facility for:

- purchasing
- inventory control
- receiving and delivery
- raw materials usage & handling
- labeling, storage, & segregation
- empty container management
- preventive maintenance
- training & supervision
- optimizing operations & processes

Good housekeeping and operating procedures often have great waste reduction impact, and involve little capital expenditure or effort to implement. Include them as part of your overall operating plan, and implement them first in order to get the most out of your waste minimization program.

Additionally, savings from these simple measures can often help to offset expenditures for subsequent, more capital-intensive options.

Purchasing Procedures

Good purchasing procedures will identify and reduce potential waste before it enters your business

Also see "Empty Container Management" on page 4-5. ➡

Purchasing Property: An Additional Concern

Owning or leasing property could make you liable for cleanup of existing or future contamination. Require the seller to pay for an independent survey to determine and document that the property is free of any hazardous materials contamination or abandoned wastes.

- ❑ Material Review: Evaluate the materials used by your business, look for less- or non-toxic substitutes, and purchase:
  - The least toxic and least costly-to-handle products that work
  - Higher-purity raw materials
  - Noncorrosive raw materials
- ❑ Container Review: Consider your intended use and standard operating practices, and purchase materials in the size and type of container which will minimize material losses and costs:
  - Buy in smaller containers if transfer from large to smaller containers is generally required before use (There will be less potential for spills, material evaporation, contamination from unused material returned to the original container, and expiration of unused materials.)
  - Buy in pre-weighed packages to reduce handling losses (if applicable)
  - Buy materials used often in larger containers (Buying in bulk can reduce the number of containers requiring disposal, especially if refillable containers are used.)
  - Buy containers that are wider than tall (They have less "cling," resulting in greater material use and less container residue.)
  - Buy containers which minimize disposal problems (e.g. filliable pressurized spray cans in place of single use aerosal spray cans)
- ❑ Chemical Samples: Establish a policy for accepting samples so they do not accumulate and add to waste disposal load:
  - Designate one person responsible for acceptance of chemical samples
  - Test on a bench scale basis to reduce volume needing disposal
  - Require that suppliers accept back the unused samples they provide
- ❑ Equipment Evaluation: Prior to purchase, ensure that new equipment:
  - Is that which will generate the least amount of hazardous waste possible
  - Can be easily maintained (Preventive maintenance can save 3-4 times the equipment cost by reducing breakdowns and malfunctions.)
  - Complies with applicable environmental and safety standards (Check with regulating agencies. Use suppliers knowledgeable in these areas.)
- ❑ Centralized Purchasing: Channel material purchases through a central person or department to:
  - Eliminate unnecessary purchases
  - Ensure that all waste reduction purchasing policies are followed
- ❑ MSDSs: Make certain that distributors supply you with Material Safety Data Sheets for all purchased hazardous materials in order to:
  - Know material hazards, proper safety precautions, and handling and emergency response procedures
  - Comply with worker and community Right-to-Know laws
  - Help you determine the nature of your wastes
- ❑ Evaluate Facility Design: Consider waste reduction when planning expansions, and evaluate potential building purchases/leases to determine whether the building design is amenable to waste reduction. Make sure that:
  - Shop equipment can be laid out in an efficient manner
  - Hazardous materials storage areas exist or can be easily installed
  - Space and utilities are available for proper recycling and treatment needs, etc.
  - There are large access doors, wide walkways, and other amenities which can increase ease and safety of operations

Inventory Control Procedures

Inventory control procedures are important for reducing management costs and potential hazards associated with excess, off-spec, and expired materials

- ❑ Set Inventory Limits: Set according to emergency response capacity. (How large an inventory can your spill/emergency response equipment and personnel handle? The more inventory of hazardous materials, the greater the chance for overcrowding storage areas and resulting safety problems such as spills, exposures and fires.)
- ❑ Minimize Inventory: Buy and stock only what you need (Costs associated with hazard risks, hazardous materials fees, and disposal of excess or expired stock may outweigh the costs of waiting for resupply shipments.):
  - Carefully consider large purchases (especially if only to get a discount)
  - Time deliveries to coincide with production needs ("just-in-time" system)
- ❑ Track Materials: Effectively track the shelf-life of time-sensitive materials and use the oldest stock first ("first-in, first-out"):
  - Label, date, and inspect new materials as they are received
  - Keep records of dates of receipt and usage to help reduce overstock and material degradation
  - Inventory raw materials at least once per year
  - Consider computerizing your tracking system
- ❑ Storage Conditions: Maintain proper temperature, humidity, etc. to reduce material degradation
- ❑ Reduce the Number of Similar Products (e.g. If you use several types of solvents, could fewer do the job? Reducing the number of solvents would improve inventory control and enhance recycling opportunities.)
- ❑ Look for substitutes with longer shelf lives
- ❑ Use waste exchanges for overstock, off-spec, or expired materials
- ❑ Work with vendors to accept back excess, off-spec, or expired materials

See Appendix D on "Waste Exchanges"

Receiving Procedures

Good receiving procedures will prevent acceptance of shipments which are off-spec, incorrect, or improperly packaged, and reduce unnecessary waste generation, returns, and spills

- ❑ Control all incoming materials by:
  - Receiving them in a specific, designated area
  - Designing the area to prevent and control release of materials
- ❑ Train receiving dock employees on proper handling of shipments to prevent property losses, injuries, and costly waste disposal
- ❑ Inspect shipments prior to acceptance:
  - Check for opened, damaged, or leaking containers
  - Check expiration dates and ensure proper labeling (see "labeling" pg. 4-4)
  - Test for off-spec materials
  - Obtain MSDS if product is new
- ❑ Use quality suppliers (quality and reliability are as important as cost):
  - Supplier should deliver goods intact and according to your specifications
  - Check the track record of your supplier with other companies or references
- ❑ Review or create purchase agreements:
  - Specify terms and conditions for receiving material orders
  - Include provisions which allow you to inspect materials prior to acceptance
  - Address responsibility in the event of a release (Specify terms under which each party is responsible for cleanup or other expenses incurred to control an incident.)
- ❑ Document agreements to ensure that specified procedures are followed (Remember, suppliers want your business and should be willing to ship on your terms. If not, try to find another supplier or change products.)

Delivery Procedures

The same measures used to control problems in receiving can be applied to delivery operations to reduce the potential for accidents and associated liabilities.

- ❑ Request that customers designate a specific area for receiving shipments which is designed to prevent and control accidents and releases
- ❑ Request that customers use only workers trained in hazardous materials handling
- ❑ Use delivery agreements to limit your responsibility once you have delivered goods to a customer:
  - Require customers to inspect all deliveries
  - Document that the materials have been received in acceptable condition
- ❑ Obtain written copies of all delivery agreements to ensure that proper procedures are followed

Raw Materials Use & Handling

More efficient utilization of raw materials will reduce losses and unnecessary waste generation

- ❑ Ensure that employees:
  - Use supplies only for their intended purpose
  - Use only the amount necessary
- ❑ Keep frequently used hazardous materials near the site of use to minimize spills/accidents
- ❑ Provide transfer methods which prevent spills and quality problems:
  - Pipelines for intermediate transfer
  - Gravity spigot or pump to dispense bulk liquid materials
  - A spout and funnel for transferring liquids to different containers
  - Proper connection/disconnection of hoses and lines
- ❑ Control access to hazardous raw materials:
  - Designate central personnel to distribute materials
  - Limit access to employees trained in hazardous materials handling and who understand the importance of first-in first-out policy
- ❑ Keep records of when and why larger spills occurred in order to identify spill prevention opportunities and document related costs

Proper Labeling

Proper labeling is extremely important to prevent accidents and extra disposal costs.

- ❑ Ensure proper labeling of all incoming materials as they are received (Include product name, weight, concentration, lot number, date, hazard class and any other information useful in tracking material location, quality, age or use.)
- ❑ Always label hazardous waste at its point of generation where it can still be easily identified (Testing later to determine the contents is expensive.)
- ❑ Label all stationary tanks, pipelines, etc. containing hazardous materials or wastes
- ❑ Label all portable "squeeze" bottles

Storage Areas

Well-designed hazardous materials and waste storage areas minimize and contain spills and provide for easy inspection of containers

- ❑ Use high quality, resealable containers to prevent spills, evaporative losses, and contamination; and keep the lids/seals closed when not in use
- ❑ Arrange raw materials storage with access to front and back of shelving so new materials can be placed behind older stock
- ❑ Keep raw material and waste storage area aisles clear of obstructions:
  - Allow elbow room to access all containers easily and minimize spills
  - Space containers to allow inspection for corrosion and leaks
  - Maintain clear, even surfaces on pathways used by workers or equipment

Storage Areas, cont.

- ❑ Keep storage areas clean and well-lit
- ❑ Stack containers no higher than recommended by manufacturer, in a way which minimizes the potential for tipping, tearing, puncture, or breakage
- ❑ Don't stack equipment against containers
- ❑ Make sure containers and shelving or storage areas are earthquake safe
- ❑ Insulate electrical circuitry and check frequently for corrosion and potential sparking
- ❑ Raise drums off floor to prevent corrosion from concrete "sweating"
- ❑ Provide secondary containment and maintain proper distance between different materials
- ❑ Install sloped concrete floors and curbs or berms for spill containment
- ❑ Cover outdoor storage areas to prevent contamination of storm water
- ❑ Secure storage areas to minimize liability and hazards of intrusion or dumping

Hazardous Materials & Wastestream Segregation

Use of simple segregation practices can prevent accidents or emergencies, reduce waste disposal costs, and enhance recovery/recycling opportunities

- ❑ Segregate raw and waste materials
- ❑ Segregate incompatible materials/wastes by hazard category to prevent reactions (e.g. strong acids and bases)
- ❑ Segregate hazardous from non-hazardous wastes (Never mix non-hazardous waste with hazardous waste – all of it becomes hazardous.)
- ❑ Place distinct wastestreams in separate containers and segregate containers holding different wastes
- ❑ Segregate empty containers by prior contents
- ❑ Set up manned collection centers to prevent unauthorized mixing of wastes

Empty Container Management

Recycling and reuse are good alternatives to managing empty hazardous materials/waste containers as hazardous waste

- ❑ Return empty containers to the supplier: Some empty product containers can be returned to the supplier for refilling. Use a supplier which offers this service. Maintain drums in good condition (with all bungs, rings, and closures in place) for deposits to be refunded.
- ❑ *Recondition onsite or contract with drum reconditioner: Drums made of heavy gauge steel can be reconditioned. These cost more, but have a good outlet for minimal or no cost. Maintain drums in good condition (with all bungs, rings, and closures in place) and don't accumulate for long periods to prevent possible deterioration.
- ❑ *Reclaim scrap value onsite or contract with scrap dealer
- ❑ *Dispose of at a regular (nonhazardous) solid waste facility: Applicable only for containers which hold 5 gallons or less. Consider potential future clean-up liability.

*To use these options, containers must meet the regulatory definition of "empty" (liquid materials – drip dry; solid materials – scraped clean). "Empty" containers over 5 gallons must be marked with the date emptied and managed by one of these methods within one year. Containers which held acutely or extremely hazardous waste must be completely decontaminated (triple-rinsed) to be considered "empty." Rinsing and treatment other than physical methods (tilt, scrape, chip) requires a treatment permit (from Cal/EPA DTSC). Other procedural and recordkeeping requirements apply. Call the County Hazardous Materials Compliance Division (HMCD) for more information.

Preventive Maintenance Practices

A strict preventive maintenance program can reduce equipment breakdown, inefficient operation, leakage, and resulting cleanup

- ❑ Keep shop clean and orderly
- ❑ Curtail water use for spill cleanup and use dry cleanup methods to minimize cleanup wastes:
  - Clean up small spills with rags (do not saturate, keep in covered container) and send to an industrial laundry service (try to find one which recycles its wastewater)
  - Contain and recover fluids for reuse or recycling (squeeze from mop, wring from rags or absorbent mats, use a wet/dry vacuum)
  - Sweep floor using dry absorbent material
  - Reuse absorbents until spent, then dispose of properly
- ❑ Periodically test container integrity
- ❑ Routinely inspect and address all potential sources of leaks and spills. Check:
  - Process and storage tanks, including all equipment attached to them
  - Pipes, valves, and hoses (Look for leaks at seams, pump seals, and flange gaskets.)
  - Material, waste, and empty container storage areas
- ❑ Inspect inventory and other storage areas for improper labeling and aged materials
- ❑ Monitor and test all discharges from internal heating and cooling coil quarterly
- ❑ Install, and periodically inspect, spill and leak controll equipment:
  - Spill basins on dikes
  - Splash guards and drip boards
  - Overflow control devices, alarms, rupture disks, and relief valves
  - Interlock devices to stop flow to leaking sections
  - Leak detection systems
- ❑ Maximize use of welded piping construction, instead of flanged pipe joints
- ❑ Use flange guards, double seals, and bellow-sealed valves
- ❑ Use pumps with double mechanical seals, or canned (seal-less) pumps

Training & Supervision

Good employee development and training programs promote waste reduction and the efficient use and handling of hazardous raw materials, and minimize worker exposures and accidents.

- ❑ Improve operator training
- ❑ Improve quality control
- ❑ Improve supervisor-employee communication
- ❑ Train employees in safe handling of hazardous materials, proper waste management, and emergency/spill response
- ❑ Provide additional training in waste reduction practices and increase employee awareness of waste management costs to encourage consistent use of these practices
- ❑ Prepare operating manuals or detailed instructions to increase employee safety and efficiency. Include:
  - Detailed descriptions of normal operating practices
  - Listing of process operating conditions and controls
  - Listing of effluent/emission discharge levels
  - Description of overall process and role of each individual position
  - Identification of safety hazards and how to address them
  - Outline of emergency procedures
- ❑ Place signs with operating directions on specific equipment

- ❑ Schedule operations to minimize cleanings required ("procedural scheduling"):
  - Schedule jobs in batches and maximize batch size
  - Printing/coating/mixing operations, etc., begin with lighter color and proceed to darker ones, do runs of like colors back-to-back, ("gang-up" jobs)
  - Avoid shifting production schedules for rush orders (May increase waste production by increasing cleaning requirements or causing material scheduled for production to be wasted.)
- ❑ Optimize raw material use and minimize residues (which become cleaning wastes):
  - Allow adequate drainage of parts and equipment
  - Use nonstick surfaces and minimize wetted surface area (Cylindrical tanks with height and diameter about equal are most efficient.)
  - Use mechanical or manual wall wipers on tanks
  - Use better process-monitoring systems
  - Routinely calibrate and adjust all automatic process control devices to increase productivity and prevent loss
  - Keep temperatures at optimum levels (note material boiling point on MSDS to minimize evaporative losses)
  - Check mechanical agitators to ensure proper operation and mixing
  - Adjust input material feed flow and purity controls
- ❑ Use efficient washing and rinsing methods
  - Eliminate the use of filter aids
  - Use countercurrent and reactive rinsing methods
  - Recycle spent washwater

Optimizing Operations & Processes

Attention to maintenance and operation of process equipment can reduce the frequency of cleanings, and prevent production of off-spec products and excess spent process materials

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Industry-specific Practices

The following lists of industry-specific practices were compiled from various research and educational publications, and edited based on review and comment by industry representatives (see side panel).

Specific practices listed are *not* recommendations. They are examples of measures which can and have been implemented by facilities to reduce waste generation and/or improve waste management. Use them as a starting point for ideas which may be appropriate for your business.

Many suggestions are not applicable to all facilities. Some may require regulatory authorization or notification. Many may require additional research or testing to determine specific equipment and procedural requirements, and to ensure that their implementation will result in the desired outcome.

Carefully consider material and process changes. When implementing such changes, be sure to:

- Use very strict process control – implement one change at a time and monitor results (look at scrap/rework rates and product quality in particular)
- Consider resulting changes in utility and/or labor requirements and costs
- Determine if any new wastestreams will be generated and how they will be managed (e.g. ion exchange resins will periodically require regeneration or disposal)
- Discuss any major changes with regulatory agencies to ensure compliance (or to determine if changes will result in *less* regulation)

Chapter 3 (pages 3-7 to 3-9) and the related worksheets can provide additional guidance for comparing alternative waste reduction options, determining their impacts, and beginning implementation.

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* In this section:

(1) A green asterisk (*) next to a listed practice indicates that industry reviewers considered it a particularly good suggestion based on effectiveness and effort/expense required to implement.

(2) Resources used to develop each industry-specific list of practices are indicated by a "source number" (S1, S2, S3, etc.) which refers to resources listed in Appendix A.

Analytical & Clinical Laboratories

Also see page
4-13: *General Solvent Use & Cleaning/Degreasing*

Good Housekeeping & Operating Practices

- ❑ * Establish a central chemical inventory and purchasing program to prevent overstocking and implement waste minimization policies, such as:
  - Rotate chemical stocks to ensure use before expiration ("first-in, first-out")
  - Exchange unused chemicals among various laboratory facilities
  - Establish long-term strategies on such issues as surcharges, recharges to labs generating waste, central storehouse for chemical distribution, and contracts with chemical suppliers to return unused chemicals
  - Avoid "gifts" that cannot be used and will require later disposal
- ❑ * Use computer tracking to keep records of chemical inventories, chemical purchases, and waste generation (Consider using already-developed chemical inventory system software packages.)
- ❑ Do dry runs of experiments to avoid spillage and waste
- ❑ * Practice wastestream segregation by avoiding mixing non-hazardous with hazardous waste
- ❑ * Consolidate partly-filled bottles in lab packs
- ❑ Compact lab debris to reduce volume
- ❑ * Establish a student and employee education program using posters, fact sheets, and visits by lab safety committees (very important)
- ❑ * Train laboratory technicians on ordering less chemicals, alternatives to reduce chemical usage, the importance of proper waste disposal, and proper waste identification (very important)
- ❑ * Use microglassware and microlab techniques (this has led to a 100-fold reduction in some laboratories' solvent generation)

Material Substitution

- ❑ * Use washable cloth rags instead of paper towels for cleanup and small spills, and contract with a commercial launderer to "recycle" rags (try to find one which recycles its washwater)
- ❑ Substitute less hazardous chemicals in experiments (e.g. alcohol for benzene; sodium hypochlorite for sodium dichromate; cyclohexane for carbon tetrachloride; stearic acid for acetamide in phase change and freezing point depression experiments; and dichloromethane for chloroform)
- ❑ * In cleaning laboratory glassware, substitute specialty detergents for sulfuric and chromic acid cleaning solutions

Materials Recovery

- ❑ Let solids in used solvents settle, then decant off liquid for reuse as a first rinse/presoak for dirty brushes or equipment
- ❑ Exchange unused/uncontaminated chemicals among laboratory facilities
- ❑ Recycle and reclaim chemicals when possible (e.g. photo chemicals and flammable liquids)
- ❑ Recycle solvents with onsite distillation unit if there is sufficient quantities to make it cost-effective
- ❑ Recover platinum, palladium, and rhodium contained in catalysts

Process Modifications

- ❑ Use instrumental analysis rather than wet chemistry
- ❑ Decompose carbon disulfide using hypochlorite
- ❑ Oxidize inorganic cyanides using aqueous hypochlorite
- ❑ Neutralize strong acids with tap water and agricultural lime and strong bases with muriatic acid

Sources (refer to Appendix A):
S6, S13, S14

Automotive Repair

Also see pages
4-13: *General Solvent Use & Cleaning/Degreasing*
4-20: *Painting, Coating, & Stripping*

Good Housekeeping & Operating Practices

- ❑ Become a "zero discharger" (eliminate industrial discharge to sanitary sewer)
- ❑ Minimize the inventory of fluids and chemicals
- ❑ Drain and replace motor oil, coolant, and other fluids in a designated area which is not connected to the storm drain or sanitary sewer
- ❑ Place drip trays under leaking autos (even if you suspect leaking has ceased); cars with unclipped hoses, unscrewed filters, or other removed parts; and hot tanks, cleaning tanks, and parts washers
- ❑ Use large low-brimmed pans under cars where mechanics are working
- ❑ Reduce equipment leakage through more frequent scheduling of preventive maintenance
- ❑ Place clean-up supplies in convenient, easy-to-locate areas around the shop
- ❑ * Minimize cleanup wastes:
  - Use squeegees and rags for small spills
  - Use "hydrophobic" (absorbs oils, not water-based liquids) mop to separate spilled oil from antifreeze/water and place recovered liquids in waste oil drum and waste antifreeze container for recycling
  - Use a wet/dry vacuum for larger coolant spills and put recovered liquid in waste antifreeze drum
- ❑ Preclean excessively soiled parts when using a hot tank
- ❑ Place parts washers/solvent sinks near working areas and install spill basins
- ❑ Remove hot tank solids and recharge solution
- ❑ Prevent need for intense cooling system flushes by changing coolant more frequently
- ❑ * Reduce spills and sloppy work areas through employee incentive programs such as:
  - Bonuses/prizes for safety violation-free months
  - Posting photographs of poor/good employee work areas
  - Using employee spill/accident record as one criteria in determining pay increases

A Mtn. View auto repair shop has been very successful in minimizing waste generation. *See case study on page 3-1.*

Material Substitution

- ❑ Use longer-lasting synthetic oils
- ❑ Substitute water-based cleaners for solvent cleaners
- ❑ Purchase re-refined oil and antifreeze for use in your shop (if meets appropriate standards, warranty, etc.)

Materials Recovery

- ❑ Use an industrial laundry service for shop rags and uniforms (Keep rags in a covered container and do not saturate. Try to find a service that recycles its wastewater.)
- ❑ Contract with recycling services for used oil and antifreeze (or recycle antifreeze onsite if you have/use large volumes)
- ❑ Recycle solvents with a service that replaces dirty solvent with fresh on a regular or "as-need" basis, or use an onsite distillation unit if there is sufficient quantities to make it cost-effective
- ❑ Reclaim and reuse all freon

Process Modifications

- ❑ Use a fluid brake cleaning method instead of a vacuum to contain asbestos more effectively (fluid is recirculated)
- ❑ Use high temperature ovens and dry abrasives (shot blast) for parts cleaning (be sure meets local air emission restrictions)

Radiator Repair-Specific:

- ❑ * Use a radiator flush booth that recirculates flush water
- ❑ * Reduce wastewater by:
  - Increasing pressure and decreasing water flow in (non-recirculating) flush booths
  - Adding fresh water only to the test tank – as test tank water becomes unusable, transfer it to the recirculating flush booth, then transfer it to the hot tank/ultrasonic cleaner for use in radiator precleaning
  - Capture water spills with a wet/dry vacuum and transfer to the hot tank
- ❑ Settle solids from test tank water when cloudy and reuse water
- ❑ Recover test tank water, recirculated flush booth water, and spilled water with chemically-assisted filtration rather than adding to hot tank (save water and energy if hot tank is turned off earlier)
- ❑ * Only use hot tank when necessary – use smaller tanks with ultrasonic cleaning for light jobs
- ❑ Monitor and maintain boil-out tank to keep at optimum operating conditions
- ❑ When emptying boil-out tank, remove the solids, reuse the liquid, and reconstitute the bath
- ❑ * To extend the life of water used in the recirculating flush booth, minimize dragout from hot tank:
  - Install hang bars over tank
  - Blow residual caustic solution back into hot tank using compressed air
  - Pre-rinse radiator over hot tank using pressurized spray
- ❑ Solder over drip pan rather than over test tank
- ❑ Use a zinc-free flux and lead-free solder

Automotive Repair, cont.

Take a look at the Vendor Directory for companies which sell recirculating radiator flush booths and other equipment.

Sources (refer to Appendix A):
S4, S5, S13, S16, S22

Construction-related Activities

- ❑ Cover all raw materials (especially plaster and other powders), by-products, containers, wastes, and dumpsters with tarps, plastic sheeting, or roof structure to prevent rainwater contamination and sunlight deterioration
- ❑ Hazardous waste/materials storage:
  - Keep lids closed on containers
  - Store on a diked concrete pad when possible to improve spill containment
  - Surround with a berm or secondary containment
  - Store in garages or sheds with secondary containment during rainy periods
- ❑ Vehicle and equipment maintenance:
  - Maintain vehicles and heavy equipment and inspect frequently for oil, fuel, or other fluid leaks
  - Refuel and perform routine vehicle and equipment maintenance in one designated area
  - Perform major maintenance, repair jobs, and washing offsite
- ❑ Use drip pans and drop cloths to catch drips, splashes, or spills, and dispose of properly
- ❑ Use hand pumps or dispensers to reduce the risk of spilling liquids such as gasoline and kerosene
- ❑ If vehicle fluids, paints, solvents, etc. leak or spill:
  - Clean up immediately using dry cleanup methods (absorbent materials, cat litter, and/or rags – reuse until spent)
  - Contain large spills immediately and notify the appropriate agencies
  - Cover areas containing spill residues to prevent stormwater from contacting contaminants

Also see pages
4-10: *Automotive Repair*
4-13: *General Solvent Use & Cleaning/Degreasing*
4-20: *Painting, Coating, & Stripping*

Good Housekeeping & Operating Practices

Controlling stormwater runoff from construction sites is important to prevent contamination of the bay (see page 2-10 for related information and resources).

Construction-related Activities, cont.

Material Substitution

- ❑ Substitute water-based for oil-based paints and coatings
- ❑ Replace solvents with film-free biodegradable cleaners for cleaning operations such as preparation of marble, metal window frames, or other substances for application of adhesives
- ❑ For cleaning applications where biodegradable cleaners are inappropriate (such as cleaning electrical contacts), use water soluble solvents
- ❑ Use non-chlorinated strippers instead of methylene chloride to remove varnish, paints, sealers, and finishes from wood, concrete, and metal surfaces (takes approximately 30 minutes rather than a few)

Materials Recovery

- ❑ Use an industrial laundry service for rags (Keep rags in a covered container and do not saturate. Try to find a service that recycles its wastewater.)
- ❑ Contract with recycling services for used oil and antifreeze (and purchase re-refined oil and antifreeze for use in your vehicles)
- ❑ Use a solvent recycler that replaces dirty solvent with fresh on a regular or as-need basis
- ❑ Let solids in used solvents settle, then decant off liquid for reuse as a first rinse/presoak for dirty brushes or equipment
- ❑ Recycle reusable materials onsite or contract with recycling service(s) (Recyclable materials include concrete, asphalt, metal scrap, solvents, degreasers, cleared vegetation and topsoil, paper, rock, and vehicle maintenance materials such as oil, antifreeze, batteries, and tires.)

Sources (refer to Appendix A): S6, S13, S17

Dry Cleaning

Good Housekeeping & Operating Practices

- ❑ Substitute low temperature laundering for dry cleaning when applicable
- ❑ Routinely check the following areas for liquid leakage:
  - Hose connections, couplings, and valve machines
  - Saturated lint from lint basket
  - Door gasket and seating
  - Pumps and storage tanks
  - Filter sludge recovery
  - Distillation unit
  - Filter head gasket and seating
  - Water separators
  - Cartridge filters
  - Diverter valves
- ❑ Check baffle assembly in cleaning machine weekly
- ❑ Check air relief valves for proper enclosure
- ❑ Adjust in-and-out condensing coil temperature on heater to within 10°F of each other
- ❑ Periodically replace the seals on dryer deodorizing and aeration valves
- ❑ Repair holes in air and exhaust ducts
- ❑ Replace faulty gaskets on cleaning machine door or tighten enclosure
- ❑ Clean lint screens regularly to avoid clogging fans and condensers
- ❑ Open button traps and lint baskets only briefly as necessary for cleaning
- ❑ Allow only batch discharge of decant water from separator after visual inspection (may not be acceptable to POTW)

A Santa Clara dry-cleaner has taken proactive steps to meet pending air quality regulations and reduce perc use. *See case study on page 2-1.*

Materials Recovery

- ❑ If a "dry-to-dry" non-vented system is not used, install a carbon adsorption unit to reclaim solvent from air emissions
- ❑ * Install solvent distillation unit to reclaim solvent
- ❑ Recycle solvents from filters and cartridges (e.g. steam strip)
- ❑ Use a reclaiming dryer to reduce solvent losses
- ❑ Utilize azeotropic conditioning to recover solvent (supercondenses the solvent)

Drycleaning, cont.

Process Modifications

- ❑ Use a halogen leak detector
- ❑ * Use an automated solvent system to eliminate overuse of solvent, soap, sizing, and brightener, and ensure appropriate removal and distillation of dirty solvent (expensive)
- ❑ Retrofit "dry-to-dry" vented systems to non-vented systems to reduce solvent vapor losses and increase recovery
- ❑ Replace older systems with a "dry-to-dry" non-vented system (expensive)
- ❑ Use a refrigeration/condensation system
- ❑ Install solvent leak detectors to monitor for vapor losses
- ❑ * Encourage manufacturers to:
  - Redesign separators with baffles and decant taps to reduce perchloroethylene (PCE) entrainment and afford better decanting of water
  - Provide double-walled tanks

⬅ (Financing available! See "CLEAN" program, page C-2.)

Sources (refer to Appendix A):
S12, S13, S22

General Solvent Use & Cleaning/Degreasing

General Solvent Use:

Good Housekeeping & Operating Practices

- ❑ Store fresh or used solvents in covered containers (properly vent as needed)
- ❑ Use an industrial laundry service to clean contaminated rags (Store rags in a closed container. Do not saturate. Try to find a service which recycles its wastewater.)
- ❑ Avoid spraying, showering, or splashing solvents
- ❑ Minimize the number of different solvents used and segregate different solvents (as specified by recycler) to enhance reuse and recycling opportunities

Materials Recovery

- ❑ Reuse spent solvents (e.g. use spent high-grade solvents in lower-grade uses; allow solids, such as paint, to settle in used solvent and decant liquid solvent for reuse)
- ❑ Use a solvent sink service that replaces dirty solvent with fresh on a regular or as-need schedule for equipment and parts washing
- ❑ Recycle spent solvent with an onsite distillation unit if quantities are sufficient to make it cost-effective

Parts Cleaning/Degreasing Operations:

Good Housekeeping & Operating Practices

- ❑ Turn off solvent flow and cover or plug solvent sink/tank when not in use
- ❑ For tanks that are used continuously, install lids with "silhouette entries" (openings closely match the shape of items being cleaned)
- ❑ Maintain solvent quality by:
  - Properly maintaining equipment to prevent water contamination
  - Allowing only dry parts to enter the cleaning operation
  - Adding chemical stabilizers to solvent to keep it from going acidic
- ❑ Minimize drag-out of solvent by:
  - Allowing parts to drain adequately
  - Using drip racks above solvent sink or degreaser to allow adequate drainage of heavy parts
  - Using drain boards or drip guards to direct spillage back into tank
- ❑ Monitor sludge volume and remove:
  - Sludge bottom buildup from soak tank when contaminants reach 10% of solvent quantity
  - Organic materials when they are 10 % by weight of a cold cleaning operation or 25 % by weight of a vapor degreasing operation
  - Metal fines (such as zinc or aluminum) immediately

Also see pages
4-20: *Painting, Coating, & Stripping*
4-24: *Process Equipment Cleaning*

General Solvent Use & Cleaning/Degreasing, cont.

Good Housekeeping & Operating Practices, cont.

- ❑ When using vapor phase cleaning, take the following measures to ensure that parts are dry:
  - Do not overload degreaser
  - Wait for condensation to stop before removing part
  - Remove parts slowly
  - Rack the parts for best drainage
  - Avoid degreasing porous materials
- ❑ When using a vapor degreaser:
  - Work in or below the vapor zone in a vapor degreaser
  - Check water separator frequently to ensure it is clean and free of debris
  - Make the sure the temperature of the water exiting the condenser coils and cooling jacket is between 90° and 100° F
  - Inspect degreasers for leaks daily and repair as necessary
- ❑ Reduce evaporation with increased freeboard† height and blankets
- ❑ Make sure degreasing tanks have empty freeboard† space above the solvent vapor zone at least 75-100 % of the tank width (freeboard = .75 or more)
- ❑ Check the freeboard† ratio daily, and any time solvent is added
- ❑ Do not locate soak tank near paint curing ovens

Material Substitution

- ❑ Eliminate the need for protective oils and subsequent solvent degreasing by having suppliers/customers:
  - Provide "just-in-time" delivery of parts
  - Use corrosion inhibiting protective films, provided they can be readily removed (e.g. organic peel coatings like polyethylene shrink-wrapping, dilute oils, organic liquids, alkaline dips)
- ❑ Use aqueous (including alkaline and caustic), terpene plant oil, or citrus-based cleaners (e.g. limonene) in place of solvents for cleaning and degreasing
- ❑ When using solvents, use less toxic solvents such as:
  - Non-chlorinated solvents in place of chlorinated solvents
  - Aliphatic solvents such as Stoddard solvent and naphthas in place of benzene and aromatic solvents
  - Aliphatic hydrocarbons, terpenes, N-methyl-2-pyrrolidone, or dibasic acid esters in place of halogenated solvents

†**Freeboard** is the distance between the solvent level and the top of the degreaser. **Freeboard ratio** =

For Cold Degreaser:

distance from solvent to top of degreaser ÷ width of the degreaser

For Vapor Degreaser:

distance from top of vapor zone to top of degreaser ÷ width of the degreaser

Process Modification

- ❑ Use multiple stage/countercurrent cleaning lines for workpiece racks to minimize waste cleaning solutions (similar to countercurrent rinse systems, i.e. use dirty solvent for initial cleaning and clean solvent for final cleaning)
- ❑ Increase solvent or aqueous cleaner performance by increasing agitation:
  - Install pump and spray
  - Use air sparging
  - Install ultrasonic units
- ❑ Install a freeboard chiller (a refrigerated coil installed above the primary condenser coil) above the vapor zone
- ❑ Reduce or eliminate solvents for drying parts by
  - Using forced air dryers rather than solvents to evaporate water from parts
  - Using water soluble rinse aids (small percentage in static rinse) to reduce water adhesion and subsequent drying time
- ❑ When using chlorinated solvents in batches of 500 gallons or more, analyze the solvent and add stabilizer formulation, not fresh solvent, as required
- ❑ Replace solvent systems with:
  - Mechanical cleaning or paint stripping systems
  - Jet spray washers, hot tanks, and steam cleaning
  - Thermal "bake-off" ovens

Sources (refer to Appendix A): S7, S8, S12, S13, S23

Machining Operations

Good Housekeeping & Operating Practices

- ❑ Standardize the types of fluids used in machining operations for as many applications as possible to minimize the management of different materials
- ❑ Perform regular cleaning of machines and sumps, and maintain gaskets, wipers, and seals (replace as needed to reduce potential contamination of fluid)
- ❑ Dedicate separate basins for the machining of different metals to facilitate recycling and place on wheels for easy mobility from work to storage areas

Material Substitution

- ❑ Use:
  - demineralized makeup water
  - non-toxic dye penetrants
  - water-based or greaseless binders
- ❑ Change to synthetic fluids with low susceptibility to contamination
- ❑ Substitute lime or borax soap for lubricating oils
- ❑ Replace standard cutting oils with biodegradable cutting oils or water soluble coolants and utilize gas coolants where appropriate
- ❑ Phase out TCA and flammable solvents and convert to water-based cleaners

Materials Recovery

- ❑ Recirculate metalworking fluids with the use of a collection basin/sump unit
- ❑ *Reuse or recycle (onsite or offsite) cutting, cooling, and lubricating oils by filtration, clarification, skimming, dissolved air flotation, coalescing, hydrocycloning, centrifugation, pasteurization, or use of specialized biocides
- ❑ Segregate and reuse scrap metal; recycle metal wastes, dusts, and sludges (see "Successful exchanges . . ." on page D-1.)

Process Modifications

- ❑ *Separate water/solvent from chemical wastestreams (i.e. coolant, oily rinse water, paint, etc.) by ultrafiltration, evaporation, coalescer, or centrifuge
- ❑ Convert machines to "misters" (a device which provides a thin mist of cutting oil directly at the point of cutting)

Sources (refer to Appendix A): S1, S13

Metal Finishing & Printed Circuit Board Manufacturing

Good Housekeeping & Operating Practices

- ❑ *Inspect integrity of plating rack coating frequently (pitting in plastic coated racks can cross-contaminate chemistry)
- ❑ Clean racks frequently to avoid having to do excessive chemical stripping
- ❑ Evenly distribute workpiece load on process lines (allows time for proper dragout, prevents surge of demand on rinse and treatment processes)
- ❑ Routinely analyze cleaning bath chemistry and add make-up chemicals to renew bath
- ❑ Operate fresh baths at lower concentrations than used baths

Material Substitution

- ❑ Use re-usable bath filters
- ❑ Use plastic coated plating racks that do not need stripping
- ❑ Use deionized or distilled water for makeup and rinses instead of tap water to reduce water volumes and improve quality

Materials Recovery

- ❑ **Reuse* compatible process baths (e.g. alkaline cleaners/etches, sulfuric solutions) as feedstock chemicals for pH adjustment and precipitation treatment of wastes
- ❑ *Purify* plating baths for reuse by carbon treatment, electrowinning, electrodialysis, filtration, "dummying" bath, or use of a porous pot
- ❑ *Regenerate* process bath chemicals, rinse water solutions, and dragouts using chemical recovery technologies (e.g. electrowinning, electrodialysis, reverse osmosis, and ion exchange)
- ❑ *Recover* metals from spent plating baths, dragout rinses, or ion exchange acid reagent streams by electrowinning

Metal Finishing & Printed Circuit Board Manufacturing, cont.

Process Modifications

- ❑ Use *in-line* metal recovery techniques on segregated rinse streams (e.g. using liquid membranes to recover copper from etching solutions, electrowinning, electrodialysis, evaporative recovery, and ion exchange)
- ❑ Recycle batch treatment sludges containing metals offsite
- ❑ Convert to dry floor (may already be required by local regulatory agency)
- ❑ Do in-house laboratory analysis to determine optimum bath replacement schedule
- ❑ Use automated chemical replacement through on-line analyzers and chemical flow meters to optimize bath concentrations
- ❑ Use spray nozzles to improve the effectiveness of aqueous cleaners
- ❑ * Install bath filters to remove particulates and trace contaminant organics

Rinsewater and Dragout Reduction:

Good Housekeeping & Operating Practices

- ❑ * Lengthen dragout time to allow more chemical into drip back to process tank
- ❑ Reduce pockets on parts to minimize chances of chemical pooling, and/or orient parts for best drainage from pockets
- ❑ * Place parts on racks that (1) have the largest draining surface as near to vertical as possible, (2) have the longer dimension of the part horizontal, and (3) have the lower edge slightly tilted so that runoff is from a corner
- ❑ * Use drainage boards and/or drip guards to minimize spillage between tanks and capture dragout
- ❑ * Install drip bars or hoists above process tanks to hang workpiece racks for hands-free drainage (helps ensure adequate drainage of heavy workpieces)

Materials Recovery

- ❑ Use "reactive rinsing" methods (reuse mild acid rinsewater as influent to rinse following alkaline cleaning bath or mild alkaline rinsewater as influent to rinse following acid cleaning bath)
- ❑ Use evaporation or reverse osmosis to concentrate dragout for reuse
- ❑ * Use multi-stage countercurrent rinses
- ❑ * Use static and/or dedicated dragout tanks after process baths to capture dragout for bath replenishment or batch treatment (reduces water volume, discharge, sludge volume)

Process Modifications

- ❑ * Agitate rinse bath or parts to promote better and more rapid rinsing (e.g. forced air or water, mechanical or operator agitation)
- ❑ Mechanize dragout to ensure proper dragout time
- ❑ Minimize plating bath concentration to reduce the degree of subsequent rinsing required
- ❑ Reduce prep bath concentrations and increase dwell times
- ❑ Increase bath temperature to (1) reduce dragout due to solution viscosity, (2) allow for reduced bath concentration, and (3) provide evaporation to allow for spray rinsing over tanks
- ❑ Increase component solubility by heating rinse water, especially through use of "waste" energy (e.g. heat from heated bath, see below)
- ❑ Circulate static rinse solutions through plating tank heat exchangers to conserve energy and allow evaporation of rinse solution
- ❑ Replace dip and countercurrent rinses with "on-demand" spray systems when part structure allows
- ❑ * Use conductivity sensors to control rinsewater cleanliness and reduce wastewater volume and water usage

A metal finisher and graphic anodizer made several modifications which have saved money, eased compliance, improved quality, and increased production capacity. *See case study on page 4-1.*

Metal Finishing & Printed Circuit Board Manufacturing, cont.

- ❑ * Use spray or fog rinses (especially with heated baths) or air knives above process tanks and/or rinses to reduce rinsewater volume and recover dragout by draining it back into the process tank
- ❑ Install flow restrictors and control valves to improve rinsing efficiency and minimize wastewater volume generated by rinsing operations
- ❑ Use wetting agents in process baths to reduce surface tension and dragout

Solvent Use-related Practices:

- ❑ * Cover cleaning tanks when not in use
- ❑ Remove sludge bottom buildup from soak tank when contaminants reach 10% of solvent quantity
- ❑ Use multiple stage/countercurrent cleaning lines for workpiece racks to minimize waste cleaning solutions (similar to multistage rinse systems, i.e. use dirty solvent for initial cleaning and clean solvent for final cleaning)
- ❑ Recycle spent solvent with onsite distillation unit if quantities are sufficient to make it cost-effective
- ❑ * Use alkaline substitutes for solvents
- ❑ Install ultrasonic units in cleaning tanks
- ❑ * Reduce or eliminate solvents for drying parts by
  - Using forced air dryers rather than solvents to evaporate water from parts
  - Using water soluble rinse aids (small percentage in static rinse) to reduce water adhesion and subsequent drying time

Improved Treatment/Minimizing Treatment Wastes:

- ❑ * Reduce water use to allow for increased dwell time in treatment unit (reduces chemical consumption and improves effectiveness)
- ❑ Use sludge dewatering equipment to reduce sludge volume (e.g. filter press, dryer), making it more economical to recycle
- ❑ Segregate chelated waste streams and handle separately to prevent interference with metal precipitation during waste treatment
- ❑ Eliminate or reduce chelations to simplify metals precipitation in wastewater treatment system
- ❑ Avoid treatment technologies that use standard precipitation/clarification methods which generate heavy metal sludges (do recycle any metal-laden sludges generated)
- ❑ Use treatment chemicals which reduce sludge volume (e.g. caustic soda, sodium hydroxide, and/or magnesium hydroxide instead of lime)

Metal Finishing-specific Practices:

- ❑ * Eliminate the need for protective oils and subsequent solvent degreasing by having suppliers/customers:
  - Provide "just-in-time" delivery of parts
  - Use corrosion inhibiting protective films, provided they can be readily removed (e.g. organic peel coatings like polyethylene shrink-wrapping, dilute oils, organic liquids, alkaline dips)
- ❑ Minimize the delay between parts cleaning and plating
- ❑ Encourage customer specifications to allow use of technologies which reduce waste generation:
  - Do not specify solvent uses
  - Approve cadmium substitutes
  - Trivalent instead of hexavalent chromium for decorative chromium plating

Also see page
4-13: *General Solvent Use & Cleaning/Degreasing*

Take a look at the Vendor Directory for companies which sell process bath recovery and wastewater treatment equipment.

⬅ (Note: Magnesium hydroxide may increase sewage discharge.)

Good Housekeeping & Operating Practices

Metal Finishing & Printed Circuit Board Manufacturing, cont.

Metal Finishing-specific Practices, cont.:

Material Substitution

- ❑ Substitute nitric or hydrochloric acids or alkaline activators for cyanide in prep baths
- ❑ Substitute non- or low-cyanide zinc plating baths for zinc cyanide (e.g. zinc chloride, alkaline zinc)
- ❑ Eliminate hexavalent chromium in prep baths
- ❑ Replace hexavalent chromium with trivalent chromium for decorative chrome plating baths
- ❑ Replace toxic cadmium plating with zinc, zinc alloys, or nickel alloys

Materials Recovery

- ❑ Use electrodialysis to recover chromium from hard chromium plating baths and rinsewaters
- ❑ Reuse nitric from process solutions for stripping electroless nickel tank or as makeup for nitric rack stripper

Process Modifications

- ❑ *Install skimmers in cleaning tanks to remove floating contaminants
- ❑ Regularly strip nickel from electroless nickel tank and components to prevent continuous deposition of nickel on the tank walls (or use passivation on stainless components)

Printed Circuit Board Manufacturing-specific Practices:

Material Substitution

- ❑ Use a fully aqueous resist instead of a solvent resist (very effective)
- ❑ Convert to tin plating and hot air leveling rather than tin/lead plating and conventional reflow
- ❑ Use water-soluble binders to minimize abrasive waste
- ❑ Use thinner copper foil to clad the laminated board

Materials Recovery

- ❑ Recycle spent photoresist stripper wastes:
  - Use filters with tank or conveyorized equipment, or
  - Decant off stripper solution to separate it from the polymer residue that forms as the solution is used
- ❑ Recover copper sulfate crystals from etching/stripping processes to extend bath life by cooling/crystallization, electrowinning, or precipitation

(Possible sale as raw material if good purity) ➡

- ❑ Reuse recovered copper sulfate crystals in copper electroplating bath (may be contamination concern) or recycle offsite
- ❑ Recycle photoresist stripper before it enters wastewater treatment stream
- ❑ Reuse nitric from stripping electroless copper tank as make-up for rack stripper

Process Modifications

- ❑ Use a combined sensitization and activation solution to eliminate an extra rinsing step
- ❑ Use pattern instead of panel plating to reduce the amount of non-circuit copper which must be etched away
- ❑ Buy efficient etch machine to reduce copper in rinsewater
- ❑ Routinely clean/strip electroless copper tank to prevent continuous deposition of copper on tank walls
- ❑ Use computerized/automated control systems for board handling and process bath monitoring
- ❑ Use additive rather than subtractive etching methods
- ❑ Encourage customer specifications to allow use of technologies which reduce waste generation
  - Surface instead of through-hole insertion mounting in printed circuit board packaging
  - Differential plating rather than the conventional electroless plating process

Sources (refer to Appendix A): S4, S5, S6, S11, S13, S22

Non-Agricultural Pesticide Application

(Landscape, Structural, & Household/Garden)

Good Housekeeping & Operating Practices

- ❑ Demand product stewardship from manufacturers (e.g. select those that accept back empty product containers)
- ❑ Triple-rinse containers and apply rinsewater on site just treated
- ❑ Purchase pesticides in packaging that is reusable, recyclable, or biodegradable (e.g. dissolvable packets)
- ❑ Purchases pesticides in "tilt and pour" containers, which eliminate the need for mixing in or transfer to another container
- ❑ Carefully evaluate pest control objectives and strategies using integrated pest management (IPM) strategies (see below under Material Substitution)
- ❑ Use monitoring devices to determine pest levels and when it is necessary to spray
- ❑ Routinely check application equipment for leaks
- ❑ Only mix what you can use and spray out that day
- ❑ Spot-treat pests whenever possible to reduce chemical usage, exposure, and expense
- ❑ Monitor the efficiency of application equipment
- ❑ Sequence applications to reduce the need for application equipment cleaning
- ❑ When possible, use reusable or semi-disposable protective clothing rather than disposable clothing
- ❑ Use measures to reduce rinsewater generated from cleaning application equipment (e.g. wiper blades, high pressure nozzles)
- ❑ Clean application equipment and vehicles at site where chemicals are applied
- ❑ Dedicate application equipment systems to reduce rinsing (especially with herbicides)

Integrated Pest Management (IPM)

IPM is a pest control approach which utilizes monitoring to determine if and when treatments are needed. IPM then employs a variety of non-chemical (physical, biological, and cultural) tactics to keep pest numbers low enough to prevent intolerable damage or annoyance. Least-toxic chemical controls are used as a last resort.

Materials Recovery

- ❑ Sweep floor to collect spills of granular products only and apply to appropriate site

Material Substitution/ Process Modifications

- ❑ Use "cold" or "heat" treatment for structural pest control
- ❑ Use aqueous cleaners in place of organic solvents when cleaning application equipment
- ❑ Use end-of-hose "proportioners" to meter appropriate amount of pesticide
- ❑ Reduce the use of pesticides by using appropriate integrated pest management (IPM) methods:
  - Physical Controls: Barriers, traps, cleanliness, caulking, handpicking, and environmental manipulation (i.e. environmental controls such as climate regulation and limiting availability of pest habitat)
  - Biological Controls: Predatory and parasitoid insects and bacterial insecticides (e.g. green lacewings for aphids, *Encarsia partenopea* wasps for whitefly, *Bacillus thuringiensis israelensis* for mosquitoes)
  - Cultural Controls: Planting disease/pest-resistant plant varieties
  - Least-toxic Chemical Controls: Insecticidal soaps, horticultural oils, desiccating dusts (e.g. diatomaceous earth), insect growth regulators (interrupt reproductive cycle; e.g. methoprene for fleas), pyrethrin-based products, etc. (Also, select the most pest-specific chemical available; choose biodegradable rather than persistent organochlorine insecticides; and choose water-based formulations in place of oil/solvent-based products.)

"Heat" treatment for structural pest control is highlighted in the case study on page E-1.

Sources (refer to Appendix A): S6, S18

Painting, Coating, & Stripping

Also see page
4-13: *General Solvent Use & Cleaning/Degreasing*

Painting & Coating Practices:

Good Housekeeping & Operating Practices

- ❑ Ensure adequate training of personnel
- ❑ *Store paints and thinners in tightly-closed containers
- ❑ Separate paint brushes, rollers, and cans from waste paint to ease waste paint collection by vacuum truck
- ❑ Post mixing instructions for coatings to stay at or below allowable VOC (volatile organic compound) content – do not add additional solvents and use measuring sticks or scales for accuracy
- ❑ *Make sure parts are clean, dry, and rust-free before painting
- ❑ Avoid adding excess thinner
- ❑ Purchase bulk quantities of commonly used coating formulations
- ❑ Reduce the need for cleaning by scheduling similar operations back-to-back and producing large batches of similarly-produced items instead of small batches of custom items
- ❑ Keep the curtain head clean at all times on curtain (flow) coating machines
- ❑ Segregate water- from solvent-based paint spray units
- ❑ *Clean paint application equipment properly:
  - Clean equipment immediately after each use before paint can harden.
  - For hand-held spray units, use a solvent rinse with occasional blow-back (cover the fluid tip and operate the trigger)
  - Direct clean-up solvents under minimal air pressure into containers to prevent evaporation
  - Soak air spray guns in closed containers and avoid the use of volatile organic compounds for clean-up
  - Rollers on roller coating machines should be cleaned regularly to remove dried paint and inspected for swelling material
- ❑ *Use the following good manual spraying technique:
  - Overlap the spray pattern by 50 percent
  - Maintain a 6 to 8 inch distance between the gun and the workpiece
  - Maintain a constant and moderate gun speed (about 250 feet/minute)
  - Trigger the gun at the beginning and end of each pass
- ❑ When using air spray guns:
  - Reduce cross drafts when applying paint
  - Reduce overspray by adjusting nozzle and avoiding excessive air pressures
  - Reduce air pressure at the spray gun nozzle on non High Volume Low Pressure (HVLP) guns
  - Use HVLP spray guns with adequate air supply and proper nozzle tips
- ❑ When using spray booths:
  - Make sure filters are installed properly and cover all openings
  - Replace filters regularly
- ❑ When using washwater booths:
  - Make sure the water curtain is continuous
  - Remove the booth and repair water lines if dry spots appear
  - Routinely check water for the proper chemical and additive mixture

Training

Studies have shown that in spray painting operations, the amount of training a painter has is at least as important as the type of equipment being used.

Material Substitution

- ❑ Substitute high-solids formulations for solvent-based formulations
- ❑ Use paints with the lowest possible volatile organic compound (VOC) content
- ❑ *Avoid using paints with heavy metal pigments
- ❑ Where practicable, use powder coatings
- ❑ *Substitute water- for solvent-based paints whenever possible

Painting, Coating, & Stripping, cont.

Materials Recovery

- ❑ Use an industrial laundry service for rags (Keep rags in a covered container and do not saturate. Try to find a service that recycles its wastewater.)
- ❑ Encourage use of leftover paint to avoid disposal:
  - Offer customers discounts on leftover paints to encourage their use
  - Give unused paint to community groups (e.g. drama groups, studio arts, schools, churches, graffiti abatement programs)
  - Use a waste exchange program (see Appendix D)
- ❑ * Allow paint solids to settle in used solvent and decant liquid solvent for reuse (e.g. reuse as pre-soak for brushes and equipment, reuse spent stripper as rough prestrip on next item)

Process Modifications

- ❑ Use a high transfer efficiency application methods to reduce the quantity of paint used:
  - High Volume Low Pressure (HVLP) or electrostatic spray units in place of conventional units
  - Use flowcoat, dipcoat, rollercoat, brushcoat, or powder coating methods
- ❑ Reduce overspray by using pressurized airless atomized spray guns
- ❑ * Install onsite paint mixers to control materials usage
- ❑ Install carbon adsorption or spray absorption systems to capture and recover solvents from air after passing through spray booth and oven (expensive)
- ❑ Used closed-loop washwater booths (expensive)

Paint Stripping – Alternatives to Solvents:

- ❑ * Use racks which can be cleaned using caustic soda or hot stripping (thermal oxidation) rather than solvent stripping
- ❑ Use aqueous stripping agents such as caustic soda rather than methylene chloride to remove alkyl resins, oil paints, cellulosics, and phenolic/gum varnishes
- ❑ Use "cryogenic stripping" and bead blasting on parts with very hard paint
- ❑ Use molten salts such as sodium metasilicate, sodium phosphate, sodium bicarbonate, or sodium hydroxide to remove heavy films of epoxy and silicon coatings (expensive)
- ❑ Use hot stripping (thermal methods) for objects that cannot be immersed

Sources (refer to Appendix A):
S7, S23

Photoprocessing

Good Housekeeping & Operating Practices

- ❑ Use lids or floating covers on all bulk solutions to prevent oxidation and contamination
- ❑ * Prolong the potency of oxidizable process baths by reducing exposure to air
- ❑ Follow manufacturer's specifications when mixing chemistries (or use an automatic blender) to ensure proper chemical make-up in process baths
- ❑ Use squeegees, air blades, and other devices between process tanks to prevent solution carryover
  - If using squeegees, make sure it is in good condition and is wiping the film or print material tightly across full width
  - If using air blades, make sure the air jet is not obstructed and is continuous in intensity across full width
- ❑ Segregate spent processing baths from wastewater stream (i.e. silver-bearing chemistry, rinse water, and other residue)
- ❑ Conduct laboratory analysis of silver content in wastewater discharge to ensure recovery equipment is working properly

Photoprocessing, cont.

Good Housekeeping & Operating Practices, cont.

- ❑ Monitor temperature and specific gravity to maintain proper water to chemistry ratio
- ❑ Replace chemistry on an as-need basis rather than a set schedule to optimize bath life and image color and reduce wastewater generation:
  - Continuous processing – adjust chemical replenishment rates and washwater flow rate one at a time, using test strips to check product quality
  - Batch processing – use test strips frequently during processing to check on product quality. Make up only enough chemical solution to complete a reasonable production batch
- ❑ Make sure electrolytic silver recovery units operate within the range specified by the manufacturer
- ❑ Test the discharge water from a metal replacement canister daily using a silver test strip

Material Substitution

- ❑ Substitute paper that uses less water and/or chemistry

Materials Recovery

- ❑ Reuse and/or recycle plastic slide boxes, waste film and negatives, 35mm film canisters, cardboard cores, metal 35mm film cassettes, 35mm and 120mm film spools, skids, office paper, and cardboard,
- ❑ * Install an ion exchange water recycling unit
- ❑ Regenerate chemistry whenever feasible (e.g. bleach fix, developers)
- ❑ Recover silver by:
  - Installing an electrolytic silver recovery unit (stand alone or in-line) and/or metallic replacement cartridges
  - Contracting with a silver recovery/hauler service

Process Modifications

- ❑ * For black and white processing, use a stop bath and hypo-cleaning agents to control processing better, increase fix life, and reduce washwater use
- ❑ Purchase new or retrofit equipment to use less rinsewater (e.g. countercurrent rinsing, rinse saver, shorter processing time)
- ❑ Purchase equipment with effective squeegee action and timers that turn equipment off automatically when not in use
- ❑ Install flow meters
- ❑ Install a solenoid valve (on/off toggle switch that senses electrical current) to automatically stop wash flow when not required
- ❑ Install a stand-by mode for idle periods to turn off dryer, drive motor, and washwater, and save energy
- ❑ Install an automatic blender to eliminate worker exposure to chemistry, reduce labor costs, minimize amount of replenisher needed, and achieve better image quality
- ❑ If using silver recovery units, consider plumbing changes that would combine washwater with fixer solutions before entering the units

A Palo Alto photo lab tested a "regenerative" bleach fix and made several other changes to reduce wastewater discharges and chemistry use. *See case study on page 1-1.*

Sources (refer to Appendix A): S6, S13, S22

Printing & Allied Industries

Also see page
4-21: PHOTOPROCESSING

Good Housekeeping & Operating Practices

- ❑ * Train press workers to minimize solvent use
- ❑ Minimize cleaning between jobs:
  - Schedule "gang-up" jobs to minimize the number of color changes required
  - If practical, schedule jobs so that they progress from lighter- to darker-colored
- ❑ Squeegee excess ink off press to minimize clean up wastes
- ❑ Instead of disposable wipes, use shop towels and contract with an industrial laundry service. (Do not saturate towels . Keep them in a covered container. Try to find a laundry service that recycles its wastewater and/or can otherwise properly manage its wastewater.)
- ❑ If disposable wipes are used, reduce usage by using dirty ones for the first pass and clean ones for the second pass
- ❑ * If possible, keep presses that use soybean, vegetable, or nut oil and are alcohol-free separate from presses using petroleum-based distillates
- ❑ Dedicate a press to toxic ink pigments and solvents
- ❑ * Fill ink fountains only when necessary to prevent contamination and possible emulsification
- ❑ Where appropriate, keep roller blade in good condition and check its angle for most effective cleaning
- ❑ Segregate aqueous wastes derived during equipment clean-up from solvent wastes
- ❑ Segregate different grades and types of paper in accordance with recycler's specifications
- ❑ * Investigate the use of aqueous cleaners – ask distributors for samples
- ❑ * Integrate amount of waste generated per process into a formula which indicates press performance
- ❑ Encourage ink distributors to take back unused and spent ink products

Printers can obtain valuable waste reduction and compliance assistance from their trade association, Printing Industries of Northern California (PINC). See pages A-1 and B-1 for related case study and profile of PINC.

Material Substitution

- ❑ * When available, substitute citric acid- and aqueous-based cleaners for petroleum-based solvents or those containing aromatics, such as phenol, benzene, toluene, and xylene
- ❑ If practicable, convert to UV (ultra violet) -curable inks
- ❑ Switch to soy or other vegetable-based inks for multicolor process inks and PMS colors (at least 30 percent of the vehicle should be soy oil)
- ❑ Switch from hydrocarbon-based varnish to aqueous-based varnishes
- ❑ Convert to alcohol substitutes for press fountain solutions, or reduce amount of alcohol to lowest possible level
- ❑ Avoid using chlorinated solvents and toxic pigments or inks containing heavy metals

Materials Recovery

- ❑ Recycle or donate waste ink, paper, film, printing plates, negatives, containers, skids (pallets), cardboard, and oil
- ❑ Save all unused portions of ink for house colors (offer customer discounts on leftover inks or use on donated jobs)
- ❑ * Recycle spent solvent:
  - Use an onsite distillation unit if quantities make it cost-effective
  - Use a solvent sink/parts washer and contract with a service which replaces dirty solvent with fresh on a regular or as-need basis

Printing & Allied Industries, cont.

Process Modifications

- ❑ Use automated features where cost effective and appropriate:
  - Non-contact electronic systems which detect web breaks
  - Web splicer
  - Blanket cleaner
  - Ink leveler
  - Plate scanner
  - Ink key setting system
- ❑ Install a waterless press (cost approximately 18 % > a water press)
- ❑ Install electronic imaging or laser platemaking to eliminate the need for photoprocessing

Plate Processing-specific Practices:

- ❑ * Prolong the potency of oxidizable process baths by reducing exposure to air
- ❑ Use floating lids/covers on all bulk solutions to prevent oxidation and contamination
- ❑ Store metal plates at recommended conditions
- ❑ Monitor plate processor conditions frequently
- ❑ Use presensitized plates
- ❑ Use nonchromate etchants
- ❑ Use a plate processor that has an automatic replenishment system for developer/fixer
- ❑ Recover metals from solution bath dumps and waste streams
- ❑ Recycle spent plates
- ❑ Investigate the use of water-based plate development systems

Sources (refer to Appendix A): S4, S6, S12, S13, S22

Process Equipment Cleaning

Good Housekeeping & Operating Practices

- ❑ Use "procedural scheduling" strategies (see "Optimizing Operations and Processes, page 4-7)
- ❑ Clean mix tanks immediately after use
- ❑ Increase spent rinse settling time
- ❑ Maximize dedication of equipment to reduce the need for cleaning
- ❑ Keep different cleaning schedules for dedicated and undedicated equipment

Material Substitution

- ❑ Re-examine the need for chemical cleaning and substitute:
  - Mechanical methods (see below)
  - Process fluids rather than chemicals or water (filter to remove solids)
  - Water rather than chemicals (e.g. hydroblasting with high velocity water jets)

Materials Recovery

- ❑ Recycle spent rinsewater

Process Modifications

- ❑ Convert from batch to continuous processes where applicable (less labor, material transfer, cleaning)
- ❑ Use closed process equipment with an inert atmosphere (prevents drying of materials such as paint, requiring less cleaning)
- ❑ Use mechanical cleaning methods rather than solvents or other chemicals
  - Manual wiping or squeegeeing of process vessels (e.g. wire brush, rubber wipers, etc.)
  - "Pigging" process pipelines with plastic or foam pigs (slugs)

Also see page 4-13: *General Solvent Use & Cleaning/Degreasing*

Process Equipment Cleaning, cont.

Process Modifications, cont.

- ❑ Inhibit fouling deposit formation to reduce the need for frequent cleaning
  - Remove deposit precursors from materials prior to use (filter, use deionized water, etc.)
  - Install corrosion-resistant pipes, vats, and materials
  - Use smooth heat transfer surfaces
  - Increase turbulence and/or reduce film temperature
  - Apply less corrosive and more thermally stable heat transfer fluids
  - Use better design and control of fired heaters
- ❑ In closed cooling water systems, inhibit fouling through proper water treatment by using a lower number of concentration cycles in the cooling tower or using make-up water with low total solids content (e.g. deionized water)
- ❑ Minimize the amount of cleaning solution or water needed:
  - Use high pressure spray nozzles
  - Use on-stream mechanical cleaning or clean-in-place (CIP) system with staged rinses
  - Filter process fluids used for cleaning and return to make-up solution
  - Control time, temperature, concentration, and turbulence of cleaning solution (less is needed as these conditions increase)
  - Use "flow-over" methods (solution is sprayed and allowed to flow off) rather than "fill-and-empty" methods
  - Use additives (e.g. defoamers, suspending agents, emulsifiers, wetting agents)
  - Use countercurrent rinse sequence
- ❑ Minimize the equipment surface exposed to process fluids by
  - Eliminating or reducing undrainable pockets
  - Using cylindrical tanks with height-to-diameter ratios close to one
  - Designing the plant accordingly if new, renovating, or relocating
- ❑ Minimize the residue left after a process by:
  - Using non-stick surfaces (e.g. Teflon coated tanks) and/or mechanical or manual wall wipers
  - Providing adequate batch drainage time
  - Rotating agitator after batch dump
  - Maximizing batch size
- ❑ Dewater spent rinse sludge

Sources (refer to Appendix A):
S7, S13, S19

Semiconductor Manufacturing

Good Housekeeping & Operating Practices

- ❑ Minimize the number of different types of solvents used
- ❑ Place covers on chemical baths when not in use to reduce vapor emissions
- ❑ *Charge short- and long-term waste management costs to the fabrication laboratories and departments responsible for waste generation
- ❑ If using a solvent-based cleaner, top off solvent baths rather than using the "fill and empty" method
- ❑ Use repeated small volume rinsing rather than single large volume rinsing
- ❑ Segregate hydrofluoric acid wastestreams from other acid wastes

Material Substitution

- ❑ If using positive photoresist, substitute non-phenolic for phenolic- based stripper
- ❑ Substitute aqueous cleaning solutions (e.g. dilute sodium hydroxide) for organic solvents
- ❑ Substitute deionized water for isopropyl alcohol and solvents in assembly area, where applicable

Semiconductor Manufacturing, cont.

Materials Recovery

- ❑ Substitute magnesium hydroxide (noncorrosive and nontoxic) for sodium hydroxide in acid neutralization (in some applications may increase wastewater discharge/sewage rate)
- ❑ Where applicable, use reclaimed water in cooling towers and scrubbers
- ❑ Have solvent contaminated clothing, rags, etc. cleaned on- or offsite using industrial laundering equipment which recovers the solvents
- ❑ Separately collect and store waste cleaning solvent for reuse in the next batch formulation or for lower grade uses
- ❑ Recycle spent solvent with onsite distillation unit if quantities are sufficient to make it cost-effective
- ❑ Reclaim vacuum pump and other hydrocarbon-based oil through onsite filtration system
- ❑ Install chemical sinks that can reuse acids
- ❑ Install onsite system to recycle hydrofluoric acid and arsenic wastes

Process Modifications

- ❑ When purchasing new equipment:
  - Consider dry pumps (saves on oil changes)
  - Install computerized in-line process/production equipment to reduce acid consumption
- ❑ Reduce waste volume by using an air aspirator for room temperature acids, or water aspirator for hot acids
- ❑ Instead of aspiration, modify baths for gravity drain and direct discharge of acids to neutralization or treatment
- ❑ Install separate solvent drain systems to segregate chlorinated from non-chlorinated solvents, aliphatic from aromatic solvent wastes
- ❑ * Circulate chemical baths using in-line filters to maintain purity and prolong bath life

Sources (refer to Appendix A): S9

Waste Minimization Resources

Case Study: Printer

West Valley Graphics (WVG), a Campbell printer, has reduced its hazardous waste generation and facilitated compliance with safety and environmental regulations by instituting material substitutions, process modifications, and good operating practices.

Material changes included eliminating alcohol and substituting soybean oil-based inks for petroleum-based inks. The Printers' Service and Technology for the Graphic Arts (PRISCO) assisted WVG in finding a cost-effective alcohol substitute and adjusting press chemistry. The switch to soybean oil-based ink reduced VOC emissions and resulted in more vivid color.

An electrolytic silver recovery unit installed by West Valley Graphics limits silver-bearing waste pickups to approximately once per year. When silver prices increase, the unit will provide additional cost recovery.

WVG has also incorporated the following good operating practices:

- *Using shop rags for cleanup and small spills and having them laundered for reuse by an industrial service that recycles its wastewater*
- *Squeegeeing excess ink off the presses to reduce cleanup wastes*
- *Recycling empty containers (from press wash, film developer, and darkroom chemistry); cardboard boxes; used film; printing plates; and paper. (Recycling of the film, printing paper, and aluminum plates has saved WVG approximately $700 per year!).*

West Valley Graphics attributes much of its waste reduction success to the technical and educational support of the printers' trade association, Printing Industries of Northern California (see related story, page B-1).

For more information call
Santa Clara County Pollution Prevention Program
408-441-1195

The programs and resources described below can provide information and/or direct you to information regarding waste minimization for your business.

Resources used in the development of this guidebook are identified with a "source" number – S1, S2, S3, and so on.

Keep in mind that any *regulatory* information provided in listed publications may not be accurate for Santa Clara County, especially if from an out-of-state source. Always check with local regulators for local requirements (refer to Chapter 2).

Most publications from federal EPA and Cal/EPA are available free. Resources from other programs may have a charge for printing and shipping costs. Prices are given where available. Call the individual program for current pricing information.

Assistance Programs & Resources

US EPA, Office of Pollution Prevention

Pollution Prevention Information Clearinghouse (PPIC)
Access: RCRA Hotline (800) 424-9346
Small Business Ombudsman (800) 368-5888
PPIC Technical Assistance (202) 260-1023

Pollution Prevention Information Exchange System (PIES)
Computer Network – no user fee, factsheet available
Items/services available: literature search, case studies, program & contacts lists, legislation summaries

Region IX Contacts:
Hilary Lauer, Pollution Prevention Coordinator (415) 744-2190
Karen Sundheim, Pollution Prevention Librarian (415) 744-1508

Pollution Prevention Resource Center, San Francisco
Will assist government agencies, industry, and the public in finding pollution prevention information, including technical, legislative, and industry-specific information contained in reports, journals, books, databases, and government publications. Can also help you become a user of PIES.

Publications available (free):

- **(S1)** Facility Pollution Prevention Guide, 5/92, EPA 600/R-92/088
- Pollution Prevention Resources and Training Opportunities
  Annual resource guide with comprehensive listings for instruction manuals, videos, fact sheets available nationwide; training courses, workshops, & seminars; program contacts.
- Pollution Prevention News - *monthly newsletter including success stories, calendar, related legislation & news, etc.*
- **(S2)** Waste Minimization: Environmental Quality with Economic Benefits - *26-page booklet highlights waste minimization concepts with examples.*
- Video: Less is More – Pollutions Prevention is Good Business (free loan)
  Highlights industry success stories

Reducing solid waste generation will save you money too by:

- *reducing disposal bin size*
- *reducing collection frequency*
- *generating revenue from valuable recyclables*

Here's some publications and programs to help get you started:

***Bay Area Reuse & Recycling Guide**, Free, US EPA, (415) 744-2074.*

***Business Guide to Waste Reduction & Recycling**, $25, Xerox Corp., (415) 424-0111.*

***The Guide to Commercial Recycling**, $20, Santa Clara County Manufacturing Group, (408) 496-6801.*

***Paper Recycling Handbook**, Free, California Integrated Waste Management Board, (916) 255-2200.*

***Recycling Handbook for Business** (includes worksheets and checklists) $35; **Reduce...Reuse...Recycle... The Bottom Line** (employee training video), $35; California Chamber of Commerce, 1-800-331-8877.*

***Market Watch**, Maintains an information database to assist in the manufacture and use of recycled products, California Dept. of Conservation, Div. of Recycling, (916) 327-2760.*

***Center for Development of Recycling**, Provides information and publications on buying recycled, recycling, reuse & repair, San Jose State University at (408) 924-5453.*

*Also see **CalMAX** in Appendix D.*

Cal/EPA, Department of Toxic Substances Control

Pollution Prevention & Technology Development (916) 322-3670

The Technology Clearinghouse provides information and publications to help businesses reduce and recycle their hazardous wastes.

Publications available: Call for a complete publications list.

- **(S3)** California Waste Exchange Directory of Industrial Recyclers & Listing of Hazardous Wastes Available for Recycling *(see Appendix D)*
- **(S4)** Hazardous Waste Reduction Factsheets:

General/Non-specific	Building/Construction	Pesticide Formulation
Aerospace	Commercial Printing	Printed Circuit Board Mfg.
Automotive Painting	Metal Finishing	Research/Educational Inst.
Automotive Repair	Paint Formulation	Trivalent Chrome Plating

- **(S5)** Hazardous Waste Reduction Checklists and Assessment Manuals:

Automotive Painting	Marine/Pleasure Vessels	Pesticide Formulation
Automotive Repair	Metal Finishing	Printed Circuit Board Mfg.
Building/Construction	Paint Formulation	(and more on the way)

- **(S6)** Hazardous Waste Audit Studies:

Automotive Painting	Marine Yards for Maintenance/Repair
Automotive Repair	Mechanical Equipment Repair
Building Construction	Metal Finishing
Commercial Printing	Non-agricultural Pesticide Application
Drug Mfg./Processing	Paint Manufacturing
Fabricated Metal Products	Pesticide Formulation
Fiberglass-reinforced & Composite Plastic Products	Photoprocessing
	Printed Circuit Board Mfg.
General Medical & Surgical Hospitals	Research & Educational Institutions
Gold, Silver, & Other Precious Metals Product &Reclamation	Stone, Clay, Glass, & Concrete Products
	Thermal Metal Working

- Alternative Technologies for the Minimization of Hazardous Waste *(Compilation of waste minimization strategy and technology studies sponsored by DTSC.)*
- Guidance Manual, Appendices, and Compliance Checklist for the Hazardous Waste Source Reduction & Management Review Act of 1989 (SB14)
- **(S7)** Guide to Solvent Waste Reduction Alternatives – Final Report
- Hazardous Waste Minimization Bibliography *(Referenced by general and industry /materials specific topics, some abstracts.)*
- Hazardous Waste Reduction: A Step-By-Step Guidebook for California Cities
- **(S8)** The Reduction of Solvent Wastes in the Electronics Industry
- **(S9)** Waste Generation and Disposition, Practices and Currently Applied Waste Minimization Techniques within the Semiconductor Industry
- **(S10)** Waste Minimization Assessment Procedures: For the Generator
- **(S11)** Waste Reduction Strategies for the Printed Circuit Board Industry
- *Video: Hazardous Waste Minimization: Planning for Success, $25 *(SB14 interactive videoconference)*
- *Video: Why Waste?: Waste Minimization for Today's Businesses, $15 *(success clips from various operations: automotive, metal finishing, pesticide and paint formulation, heavy metal rinse water, solvent, and antifreeze recycling)*
- And More Publications on:
  - Waste Reduction for Specific Wastes, Industries, and Projects
  - Alternative Recycling & Treatment Technologies
  - Remediation (Clean-up) Technology Demonstration Projects
  - Waste Minimization Grant Demonstration Projects

*These videos are available on loan from the Santa Clara County Pollution Prevention Program. Call (408) 441-1195.

Alaska Health Project

Waste Reduction Assistance Program (907) 276-2864

Has produced numerous educational materials to help businesses reduce hazardous waste production and save money.

Publications available: See complete publications list following page A-4.

- Newsletter
- **(S12)** Profiting from Waste Reduction in Your Small Business
  (Concepts similar to those presented in Chapter 3 of this document.)
- Industry-specific Factsheets, Audits, and Business Binders

Center for Hazardous Materials Research (CHMR)

University of Pittsburgh , PA (412) 826-5320 (800) 334-CHMR

Provides technical assistance and education to industry and government regarding hazardous waste management and minimization

Publications available:

- The Minimizer – *newsletter*
- Factsheets: Industry-specific, regulatory, and miscellaneous topics.
- **(S13)** Industrial Waste Minimization Manual (previously Hazardous Waste Minimization Manual for Small Quantity Generators), $60.
  General tips, industry-specific waste reduction practices for 11 different business sectors, waste-specific practices, and regulatory information.

MnTap - Minnesota Technical Assistance Program

University of Minnesota (612) 627-4646

Has produced a number of informative fact sheets and summaries.

Publications available: Call for a publications list.

- Factsheets: Waste-specific, industry-specific, equipment-specific topics
- Checklists: Process-specific checklists to identify waste reduction opportunities
- Intern Projects Summaries: Industry/process-specific waste reduction

Pollution Prevention Program

North Carolina Department of Environment, Health, and Natural Resources, Office of Waste Reduction (919) 571-4100

Have published industry-specific technical/waste minimization assistance documents.

Publications available: See complete publications list following page A-4. Obtain documents from the National Technical Information Service (NTIS) at (703) 487-4650

- **(S14)** Reduction of Hazardous Wastes from High School Chemistry Laboratories

Waste Reduction Institute (WRITAR)

Minneapolis, MN (612) 379-5995

Information on waste reduction technologies and training in waste minimization.

A more comprehensive listing of state and regional hazardous waste reduction programs and resources is available in the publication *Pollution Prevention Resources and Training Opportunities*, available free from EPA (see page A-1).

Water conservation can also save money.

Consider having a "water audit" of your facility conducted by:

- *your water company,*
- *your City, or*
- *private consultant.*

For more information on water conservation measures, call the Santa Clara Valley Water District, Water Conservation Coordinator at (408) 265-2600.

Want help to reduce your energy use as well?

PG&E operates a free energy audit program and offers rebates to companies that convert to high efficiency lighting. Call (408) 280-1212.

EPA's "Green Lights" program offers technical information, assistance, and promotional aide to organizations which agree to upgrade to cost-effective, energy efficient lighting technologies. Call the local contact at Cal/EPA for more information: (916) 445-5900.

Appendix C contains information on loan programs available to assist companies finance energy conservation measures.

San Jose Businesses

The San Jose Environmental Services Department offers assistance in all areas – recycling, energy and water conservation – to businesses located in the City of San Jose.

Publications available include:

- ***Business Waste Reduction & Recycling Handbook:*** *Guide to help companies establish in-house recycling programs and capture lost revenue*
- *Industry-specific and new construction guidelines for* ***water conservation***
- ***Innovative Design & Environmental Analysis Service (IDEAS):*** *Cost-effective energy conservation measures for new construction and facility improvement*

Call (408) 277-5533 for more information or to order.

*These videos are available on loan from the Santa Clara County Pollution Prevention Program. Call (408) 441-1195.

Miscellaneous Publications

- **(S15) Alameda County Hazardous Waste Minimization Information Packet.** Alameda County Hazardous Materials Division, (510) 271-4320.
- **(S16) Best Management Practices for Automotive-Related Industries.** *Practices for sanitary sewer discharges and storm water pollution control.* Santa Clara Valley Nonpoint Source Pollution Control Program, (800) 794-2482.
- **(S17) Blueprint for a Clean Bay: Construction-Related Industries.** *Best management practices for storm water pollution control.* Santa Clara Valley Nonpoint Source Pollution Control Program, (800) 794-2482.
- **(S18) Common-Sense Pest Control** and other pest-specific literature, Bio-Integral Resource Center (BIRC), call (510) 524-2567 for a publications list.
- **(S19) Engineering Feature: Succeeding at Waste Minimization.** *Good, concise article with brief outline and checklist.* Chemical Engineering 9/14/89, pages 91-94.
- **(S20) Generator's Waste Reduction Self Audit Quiz & Checklist,** $5.00. *Brief document with good "get you started" questions and checklists on waste reduction and environmental compliance.* Local Government Commission, Inc., Sacramento, CA (916) 448-1198
- **(S21) Hazardous Waste Minimization,** Harry M. Freeman, McGraw-Hill Publishing Company, 1990. *A collection of various articles.*
- **Pests Bugging You?** *Brochure on integrated pest management methods. Available for customer distribution by pest control/landscape services, etc.* Santa Clara Valley Nonpoint Source Pollution Control Program, (800) 794-2482.
- **(S22) Pollution Prevention Opportunities Checklists** for various industries. *Range of useful suggestions, both practical and technological.*

Chemical Mfg.	Metal Finishing	Printed Circuit Board Mfg.
Dry Cleaning	Oil & Gas Production	Printing
Formulators	Petroleum Refining	Radiator Repair
Metal Fabrication	Photoprocessing	

  Produced by County Sanitation Districts of Los Angeles County. Call the Santa Clara County Pollution Prevention Program for copies, (408) 441-1195.
- **(S23) Self Inspection Handbooks: Automotive Refinishing; Surface Coating of Metal and Plastic Parts and Products; Solvent Cleaners.** *Include measures to reduce air pollution and materials use.* Air Resources Board, Compliance Assistance Program, (916) 327-7211. (See page 2-6 for list of other handbooks available.)
- **Source Reduction of Halogenated Solvents** for various industries. *Summary and reports of studies conducted by the Source Reduction Research Partnership, a joint venture by the Metropolitan Water District and the Environmental Defense Fund (EDF).* $10 each. Order from EDF: (510) 658-8008.

Adhesives Mfg.	Electronics Mfg.	Paint Stripping
Aerosols Mfg.	Flexible Foam Mfg.	Parts Cleaning
Chemical Intermediates	Lifecycle Inventory &	Pharmaceuticals Mfg.
Dry Cleaning	Tradeoff Analysis	Textiles Mfg.

- **(S24) Waste Minimization,** Kevin Dick. *Article in the Nevada Small Business Development Center (702/784-1717) newsletter.* The Nevada Waste Reporter, Summer 1991, pgs 1-2.
- ***Video: Cleaning Up Toxics in Business** – Innovative solutions to comply with environmental regulation - highlights several small business industries.*
- ***Video: Cleaning Up Toxics at Home** – Reducing use of toxic products in the home.* Both videos produced by League of Women Voters. Available on loan at some local libraries, or call the League chapter in your city.

ALASKA HEALTH PROJECT

The Waste Reduction Assistance Program of the Alaska Health Project has produced a number of educational materials to help Alaskan businesses reduce their waste production and help them save money. The information includes practical, low-cost waste reduction techniques that businesses can use in current operations, or in planning future expansion.

* ORDER FORM *

A. DETAILED WASTE REDUCTION AUDITS ARE AVAILABLE FOR:

		Qty.			Qty.
1.	Auto Body Repair and Paint Shop (1987)	$7.50 ____	12.	Newspaper #2 (1989)	$7.50 ____
2.	Automotive Repair Shop (1987)	7.50 ____	13.	Oil Field Service Company (1989)	7.50 ____
3.	Aviation Facility (1987)	7.50 ____	14.	Photofinishing Shop (1987)	7.50 ____
4.	Dairy Foods (1988)	7.50 ____	15.	Plastic Bottlemaking/Chemical Manufacturing (1988)	7.50 ____
5.	Dry Cleaners (1987)	7.50 ____	16.	Printing Shop (1987)	7.50 ____
6.	Electroplating (1988)	7.50 ____	17.	Publishing House (1988)	7.50 ____
7.	Fur Tanning (1988)	7.50 ____	18.	Regional Hospital (1989)	7.50 ____
8.	Heavy Equipment Shop (1989)	7.50 ____	19.	Rural City Maintenance Shop (1989)	7.50 ____
9.	High School (1988)	7.50 ____	20.	Seafood Processing Plant (1989)	7.50 ____
10.	Laboratory (1988)	7.50 ____	21.	Secondary Seafood Processor (1989)	7.50 ____
11.	Newspaper #1 (1988)	7.50 ____			

B. WASTE REDUCTION AUDIT MANUAL AVAILABLE:

"Profiting From Waste Reduction In Your Small Business" is a 46-page manual to help you identify, implement and evaluate an industrial waste reduction program. This easy-to-use guide provides a business owner with step-by-step information on establishing an in-house waste reduction program. Includes ready to use forms, waste reduction examples and resources. (1988) $9.00 ____

C. Community Hazardous Materials Evaluation Program Manual

A how-to guide for communities to help them evaluate and identify problems associated with hazardous materials in their area. 76 pages. (2nd edition 1988) $9.00 ____

D. University Curriculum "Industrial Waste Reduction"

for environmental engineering students, a three-credit course, divided into 15 three-hour sessions. The course serves as an overview of waste reduction concepts and applications in Alaska and the USA. It covers waste reduction concepts, audits, programs, technologies, waste disposal, regulations, workers safety and health, and background on the development of waste management/reduction in the USA. (1991) $30.00 ____

E. BUSINESS BINDERS

These are a series of industry-specific, durable manuals to assist in identifying and implementing waste reduction in your business and complying with occupational and environmental regulations. Includes a copy of the Alaska Health Project's "Profiting From Waste Reduction In Your Small Business" and the EPA's "Understanding the Small Quantity Generator Hazardous Waste Rules: A Handbook for Small Business."

		Qty.
Waste Reduction Guide:	Auto Repair (1992)	$25.00 _____
Waste Reduction Guide:	Aviation Maintenance (1992)	25.00 _____
Waste Reduction Guide:	Dry Cleaning Business (1991)	25.00 _____
Waste Reduction Guide:	Photo Finishing Business (1991)	25.00 _____
Waste Reduction Guide:	Printing Business (1991)	25.00 _____
Waste Reduction Guide:	Shipyards (1992)	25.00 _____

Please make checks (U.S. Dollars Only) payable to Alaska Health Project. Prices include postage, (there will be additional charges for mailing outside the U.S.). Send your orders to:

Waste Reduction Assistance Program
Alaska Health Project
1818 W. Northern Lights, Suite 103
Anchorage, Alaska 99517
U.S.A.
phone: (907) 276-2864 fax: (907) 279-3089

NAME _____

COMPANY _____

ADDRESS _____

_____

_____

Please indicate the quantity of each publication ordered in the columns to the right and indicate the total amount enclosed $ _____.

POLLUTION PREVENTION TIPS

POLLUTION PREVENTION

OFFICE OF WASTE REDUCTION PUBLICATIONS

Please check publications which you wish to receive:

GENERAL AND PROGRAM INFORMATION

____ Case Summaries of Waste Reduction by Industries in the Southeast
____ Developing and Implementing a Waste Reduction Program
____ Pollution Prevention Challenge Grant information
____ Waste Reduction Techniques: An Overview
____ Handbook for Using a Waste Reduction Approach to Meet Aquatic Toxicity Limits
____ List of available audio-visual materials

INDUSTRY-SPECIFIC INFORMATION

____ Water Conservation for Electroplaters: Rinse Tank Design
____ Water Conservation for Electroplaters: Rinse Water Reuse
____ Water Conservation for Electroplaters: Counter-Current Rinse
____ Drag-out Management for Electroplaters
____ Atmospheric Evaporative Recovery Applied to a Nickel Plating Operation

____ A Workbook for Pollution Prevention by Source Reduction in Textile Wet Processing
____ Identification and Reduction of Pollution Sources in Textile Wet Processing
____ Identification and Reduction of Toxic Pollutants in Textile Mill Effluents
____ Water Conservation for Textile Mills
____ Dye Bath and Bleach Bath Reconstitution for Textile Mills
____ Ultraviolet Light Disinfection of Water in a Textile Air Washer

____ Water and Chemical Reduction for Cooling Towers
____ Small Solvent Recovery Systems
____ Solvent Loss Control - Things You Can Do Now
____ Managing and Recycling Solvents
____ Managing and Recycling Solvents in the Furniture Industry
____ Waste Reduction Options for Radiator Service Firms
____ Waste Reduction Options for Automobile Salvage Yards
____ Garage Owners: Handling of Hazardous and Solid Waste
____ Pollution Prevention Techniques for the Wood Preserving Industry
____ Silver Recovery Systems and Waste Reduction in Photoprocessing

____ Recovery of Volatile Organic Compounds from Small Industrial Sources
____ Companion Document for the Conference on Waste Reduction for Industrial Air Toxic Emissions
____ Pollution Reduction Strategies in the Fiberglass Boatbuilding and Open-Mold Plastics Industries
____ Marine Maintenance and Repair: Waste Reduction and Safety Manual

____ List of available Pollution Prevention publications for the Food Processing Industry

____ Ten Fact Sheets on Pesticides and Water Quality
____ Pesticide Rinsate Recycling Facilities Design Guide
____ Reduction in Pollution from Irrigated Farming

____ Hazardous Materials in North Carolina: A Guide for Decisionmakers in Local Government
____ Directory of Industrial and Commercial Recyclers Serving North Carolina Businesses and Communities
____ Directory of State and Local Contacts for Recycling Information and Assistance

____ Waste Management Strategies for Hospitals and Clinical Laboratories
____ Reduction Techniques for Laboratory Chemical Wastes
____ Reduction of Hazardous Waste from High School Chemistry Labs
____ Pollution Prevention Pays Instruction Manual for Technical Colleges

ORDER DOCUMENTS FROM THE NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)

(703) 487-4650

Trade Associations as a Resource

Profile of a Progressive Trade Association: PINC

The Printing Industries of Northern California (PINC) proactively educates members in environmental compliance and waste management. The association has a full-time environmental specialist on staff who has developed environmental compliance manuals specifically for the printing industry that not only outline regulatory requirements, but also provide a complete environmental compliance system with forms, examples, and instructions.

Additionally, PINC's environmental specialist, who once ran his own print shop and thoroughly understands printing processes, also conducts site visits to member shops. During visits, the specialist tours the shop, makes specific recommendations, and explains how to use the compliance "system." The result of this "team" effort is improved environmental compliance and workplace safety, and reduced waste generation and costs.

PINC has visited more than 650 shops in Northern California over the past 4 years, and continues to visit several shops per week. PINC also makes related presentations to the numerous printers craftsmen's clubs in the state.

In addition to member education, PINC cooperates with local agencies in their outreach and assistance efforts. Examples include PINC's participation with the Santa Clara County Hazardous Materials Advisory Committee, and assistance to the City of San Francisco in developing a pilot "milk-run" operation for collecting hazardous printing wastes from small quantity generators.

PINC's proactive approach on all fronts makes it a model example of how trade associations can play a key role in our efforts to successfully balance the needs of both industry and environment!

Trade associations can be of great assistance in keeping small businesses up to date on issues that concern their industry. In the areas of environmental compliance and waste management, particularly, trade associations can assist members by providing related services, such as:

- Tracking environmental legislation and providing updates on new requirements
- Maintaining information about available waste management technology, products, and services and tracking new developments
- Educating members on methods/technologies to reduce the use of hazardous materials and generation of hazardous waste
- Lobbying local, state, and federal representatives to influence legislation which affects their industry
- Working with local agencies and programs to address industry-specific concerns or needs
- Providing model examples of forms/plans/reports required for regulatory compliance and offering assistance in appropriately completing them
- Performing site visits/environmental audits of individual businesses
- Networking members and negotiating with service companies for improved waste management services and/or reduced rates

Several local trade associations which are already very active in educating members regarding environmental compliance and waste management issues include the Automotive Service Council (ASC), Printing Industries of Northern California (PINC), and Northern California Association of Metal Finishers, Inc. (NCAMF).

Even if such services are not formally provided, an association provides a forum where members can interact to share information, ideas, and concerns. If your association is not providing compliance and waste management related services, let them know that such services are needed and would be an asset to membership in the organization.

Trade Association Directory

The following pages list trade associations and other organizations of typical small- and medium-sized industries. The listings are organized by industry type for convenient searching, and include the organization's name and most local permanent address and phone number. If you do not see any listings related to your business, call the Santa Clara County Pollution Prevention Program at (408) 441-1195 for further assistance.

Agriculture

California Certified Organic Farmers
303 Protero Street, Suite 51; Santa Cruz CA 95060 408/423-2263

Santa Clara County Farm Bureau
1368 North 4th Street; San Jose CA 95112 408/453-0100

Chemical

American Chemical Society, California Section Office
2140 Shattuck Avenue; Berkeley CA 94704 510/848-0512

Chemical Industry Council of California
770 L Street, Suite 900; Sacramento CA 95814 916/442-1420

Chemical Manufacturer's Association
2501 M Street NW; Washington D.C. 20037 202/887-1100

Western Agricultural Chemicals Association
930 G Street, Suite 210; Sacramento CA 95814 916/568-3660

Construction Trades

Associated Builders and Contractors, Golden Gate Chapter
6375 Clark Avenue, Suite 100; Dublin CA 94568 510/829-9230

Associated Roofing Contractors of the Bay Area Counties
8301 Edgewater Drive; Oakland CA 94621 510/635-8800

Building Industry Association of Northern California (South. Div.)
675 North 1st Street, Suite 1240; San Jose CA 95112 408/977-1490

Cabinet and Fixtures Manufacturers Guild (CFMG)
57 Columbia Square; San Francisco CA 94103 415/863-8250

Woodwork Institute of California
3619 Beckworth Drive; Napa CA 94558 707/226-6745

Drycleaning

California Fabricare Institute of Drycleaners & Launderers
10615 S. De Anza Blvd; Cupertino CA 95014 408/252-1746

Korean Drycleaners Association of Northern California
333 East 4th Avenue; San Mateo CA 94401 415/342-3535

Electronics

American Electronics Association
5201 Great America Pky, Ste 520; Santa Clara CA 95054 408/987-4200

General

Business Environmental Network c/o Peninsula Conservation Center
3921 E. Bayshore Road; Palo Alto CA 94303 415/962-9876

California Chamber of Commerce (or try your local chamber)
P.O. Box 1736; Sacramento CA 95812 1-800-772-2399

Peninsula Industrial and Business Association (PIBA)
3921 E. Bayshore Road; Palo Alto CA 94303 415/965-6801

Santa Clara County Manufacturing Group
5201 Great America Pky, Ste 426; Santa Clara CA 95054 408/496-6801

Laboratory

Association of California Testing Laboratories
2544 Industrial Blvd; West Sacramento CA 95691 916/374-4353

California Clinical Laboratory Association
1127 11th Street, Suite 820; Sacramento CA 95814 916/446-2646

California Dental Laboratory Association
24301 Southland Drive, #408; Hayward CA 94545 510/783-3477

Landscape/Nursery

California Agricultural Production Consultants Association (CAPCA)
1608 I Street; Sacramento CA 95814 916/443-2476

California Association of Nurserymen
4620 Northgate Blvd, Suite 155; Sacramento CA 95834 800/748-6214

Green Industry Council
716 Cambrian Drive; Campbell CA 95008 408/371-7373

Machining

California Conference of Machinists
10260 Mac Arthur Road; Oakland CA 94605 510/562-8333

National Tooling and Machining Association
3375 Woodward; Santa Clara CA 95054 408/980-9745

Metal Fabrication

Precision Metalforming Association
27027 Chardon Road; Richmond Heights OH 44143 216/585-8800

Metal Finishing

Northern California Association of Metal Finishers
P.O. Box 190566; San Francisco CA 94119 415/399-9702

Paint and Coatings

Golden Gate Paint and Coatings Association
3545 Jamison Way ; Castro Valley CA 94546 510/886-4453

Pest Control

California Agricultural Pest Control Operators
374 N. Loop Drive; Camarillo CA 93010 805/482-2356

Pest Control Operators of California (PCOC)
3031 Beacon Blvd; West Sacramento CA 95691 916/372-4363

Photoprocessing

Photo Marketing Association/Association of Professional Color Labs
3000 Picture Place; Jackson MI 49201 517/788-8100

Professional Photographers of the Greater Bay Area
1251 5th Avenue; Redwood City CA 94063 415/367-1265

Printed Circuit Boards

California Circuits Association (c/o CircuiTree Magazine)
700 Gale Drive; Campbell CA 95008 408/364-3931

Printing

Printing Industries of Northern California (PINC)
665 Third Street, Suite 500; San Francisco CA 94107 415/495-8242

Refrigeration Service

Refrigeration Service Engineers Society, Santa Clara Valley Chapter
P.O. Box 3022; Saratoga CA 95070 408/450-3083

Semiconductor

Semiconductor Equipment and Materials International (SEMI)
805 E. Middlefield Road; Mountain View CA 94043 415/964-5111

Semiconductor Industry Association
4300 Stevens Creek Blvd, Suite 271; San Jose CA 95129 408/246-2711

Vehicle Service Trades

Automotive Engine Rebuilders Association
330 Lexington Drive; Buffalo Grove IL 60089 708/541-6550

California Auto Body Association
1116 24th Street; Sacramento CA 95816 916/448-5477

California Automotive Service Councils, Chapter 42 (San Jose)
1741 Saratoga Avenue, Ste 215; San Jose CA 95129 408/377-3579

California Automotive Wholesalers Association
11160 Sun Center Drive; Rancho Cordova CA 95670 916/635-9774

California Service Station and Automotive Repair Association (CSSARA)
190 Twelfth Avenue; Santa Cruz CA 95062 408/479-8143

Santa Clara County Auto Recyclers Association
PO Box 18670; San Jose CA 95158 408/727-8722

Financial Resources

GRANT & CONTRACT PROGRAMS

State Water Resources Control Board

Underground Storage Tank (UST) Cleanup Funds
Provides grants to fuel leak site owners/tank operators for reimbursement and/or prepayment of site investigation and cleanup costs incurred after January 1, 1988. Owners/operators in compliance with cleanup orders are eligible on a "first come, first served" basis in the following priority: (1) residential property; (2) small business; (3) businesses with less than 500 employees; and (4) all other claims.

– Amount Available: Up to $990,000/site
(after owner/operator pays first $10,000/site)
– Applications: Available on a continuous basis

For more information, contact:
State Water Resources Control Board
UST Cleanup Funds, Room 130
P.O. Box 944212
Sacramento, CA 94244-2120
(916) 227-4307 to request an application
(916) 227-4388 for Anna Cervin/assistance

Cal/EPA Department of Toxic Substances Control

Hazardous Waste Reduction Grant Program
Promotes the development of innovative hazardous waste reduction, recycling, or treatment projects and technologies. Grants are provided to individuals, companies, universities, government agencies, and private organizations. Proposals offering the greatest opportunity to significantly reduce the generation of hazardous waste are selected.

Grants are available in four phases:
- Step I - Feasibility Studies
- Step II - Project Design
- Step III - Construction
- Step IV - Evaluation

– Total Amount Available: Subject to funds available
– Solicitation Period: Subject to funds available

For more information, contact:
Cal/EPA Department of Toxic Substances Control
Pollution Prevention, Public & Regulatory Assistance
P.O. Box 806
Sacramento, CA 95812-0806
(916) 322-3670

US Environmental Protection Agency

Small Business Innovation Research Program
Provides research and development contracts to small businesses to sponsor and promote highly innovative pollution control and prevention projects.

Contracts are available in two phases:

- Phase I - Six Month Feasibility Study
  – Amount: up to $55,000
  – Solicitation: October - January
  – Awards given annually in July
  – Send for a solicitation packet in September
- Phase II - Development, 1 or 2 years duration
  – Amount: up to $165,000
  – Open only to completed Phase I Projects

To request a SBIR solicitation packet, write or fax:
George Rouse (MD-33)
Contracts Management Division
US Environmental Protection Agency
Research Triangle Park, NC 27711
Fax: (919) 541-0611

For more information, contact:
Donald Carey
SBIR Program Manager
(202) 260-7899

Call (202) 205-7777 to be placed on the SBIR "pre-solicitation" announcement mailing list (provides preliminary information on upcoming solicitations by 11 participating SBIR agencies).

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LOW INTEREST LOANS & LOAN GUARANTEES

California Pollution Control Financing Authority

Offers low-interest loans and loan guarantees to finance pollution control and waste disposal equipment. Several small business assistance programs are available for a variety of projects including air, water, and solid waste pollution control projects.

- Minimum Loan Amount: Varies with program
- Applications: Accepted year round

For more information, contact:
Nathan Brostrom, Director
P.O. Box 942809
Sacramento, CA 94209-0001
(916) 654-5610

California Energy Commission

Provides low interest loans and technical assistance to qualified small businesses to use or demonstrate alternative energy technologies (purchase, install, and monitor energy-saving hardware). Up to 100% of project can be financed. Technologies users will receive an energy audit at no cost.

- Minimum Loan: $5,000
- Collateral: All loans must be fully secured by applicant
- Applications: Accepted year round

For more information, contact:
Philip Misener
Small Business Energy Loan Program
California Energy Commission
Research and Development Office
1516 Ninth Street, MS-43
Sacramento, CA 95814
(916) 654-4552

US Small Business Administration

Provides loan guarantees for a variety of business purposes, including financing of the planning, design, or installation of pollution control equipment. Loans are made by private lenders; SBA guarantees a percentage of the loan.

- Maximum Guarantee: $750,000
- Minimum Guarantee: No minimum, but few lenders will consider loans below $25,000

Requirements:
- Qualified small business operated for profit
- Demonstrate ability to repay the loan
- Capital contribution is typically 1/3 of total project cost

For more information or list of participating lenders, contact:
U.S. Small Business Administration
San Francisco District Office
211 Main Street, 4th Floor
San Francisco, CA 94105-1988
(415) 744-6820

California Department of Commerce Office of Small Business

Administers three low interest loan programs designed to help small businesses reduce negative environmental impacts. Loans are made available through regional small business development corporations.

California Loans for Environmental Assistance Now (CLEAN) Program
Loans to help small businesses reduce air emissions, effluents, wastes, and other regulated by-products (also ask if the "Hazardous Waste Reduction Loan Program" is still in effect). Loans can be used to cover 100% of project costs, including assessment services, design, equipment acquisition, and implementation.

- Loan Amounts Available: $10,000 to $750,000
- Applications: Accepted year round
- The California Pollution Control Financing Authority makes all final determinations on loan approval

Underground Storage Tank Loan Program
Loans to help small businesses repair, replace, remove, or upgrade underground storage tanks to meet applicable local, state and/or federal standards. Also available for clean-up of sites contaminated by leaking underground storage tanks. Covers up to 90% of costs.

- Loan Amounts Available: $10,000 to $350,000 (up to $50,000/tank)
- Applications: Accepted year round

Energy Conservation Loan Program
Loans for measures which conserve, produce, or control energy use in new or existing facilities (e.g. lighting changes, weatherization, HVAC system upgrades, alternative energy systems, cogeneration projects.)

- Loan Amount: Up to $150,000
- Applications: Accepted year round

For more information on these three programs and applications, contact the nearest regional office:

Bay Area Small Business Development Corporation
3932 Harrison Street
Oakland, CA 94611
(510) 652-5262

California Coastal Small Business Development Corporation
Five East Gabilan Street, Suite 218
Salinas, CA 93902
(408) 424-1099

12/93

What's a Waste Exchange?

Successful exchanges save money . . .

Generators reduce transportation and disposal costs!

Receivers reduce raw material costs!

The new CalMAX program has already had some great successes:

- *The Manteca Boys & Girls Club got a real spook set for their Halloween haunted house and lumber materials for a room addition from the last Nightmare on Elm Street film!*
- *Other examples include an ongoing exchange of wooden pallets, exchanges of 4,000 tons of asphalt and 40,000 lbs. of plastic film, and miscellaneous small exchanges involving padlocks, wood reels, books, slide mounts, and more . . .*

Successful "hazardous waste" exchange stories include:

- *A company making high strength steel tools gets its steel from an east coast manufacturer. Fine steel dust resulting from grinding processes is sent back to the manufacturer and made into solid steel again.*
- *Another company making aluminum parts sends the aluminum dust from its grinding processes to a graphite manufacturer, who uses it as a component in the graphite.*
- *A company using kerosene to clean metal parts can't continue to use the kerosene once it's contaminated with 10% oil. A small company across the street uses the "waste material" as a lubricant in its trepanning process.*

Waste or "materials" exchanges promote the use, reuse, and exchange of materials which would otherwise be discarded. Designed to encourage the recovery of valuable resources and discourage their disposal to land, air, and water, waste exchanges can also assist industries in reducing their waste disposal costs. Though many industries routinely reclaim materials from their own wastes, the idea of companies reusing other companies' waste materials as feed stock may be a new concept.

Waste/materials exchanges have operated in California since 1976, and in Europe and Japan for the last 20 years. These services facilitate the exchange of industrial materials and wastes by acting as a clearinghouse and putting interested parties in contact with each other.

The California Environmental Protection Agency (Cal/EPA) operates two exchange programs:

- **California Materials Exchange** for nonhazardous materials/wastes
- **California Waste Exchange** for hazardous materials/wastes

California Materials Exchange

The California Materials Exchange (CalMAX) is a free service designed to help businesses find markets for materials they have traditionally discarded. It is operated by the California Integrated Waste Management Board and publishes a bimonthly catalog listing contacts for materials available and wanted.

The items listed in the catalog are nonhazardous, with the exception of latex paint-related products and unused chemical products at CalMAX's discretion. Examples of other types of items listed include fabric scraps, pallets, organic debris, construction and plumbing materials, furniture, electronics, and typical recyclable materials (paper, plastics, metals, etc.).

The *Business Reuse and Recycling Catalog* is divided into three main sections for convenient searching: (1) Available Materials, (2) Wanted Materials, and (3) Regional Listings of both. Listings most local to Santa Clara County can be found in Region 4, Greater Bay Area. The catalog also provides information on other local, state, and national reuse programs and assistance resources. (Plans are in the works to offer the catalog as a free computer bulletin board service as well.)

To receive the *Business Reuse and Recycling Catalog* or list items for exchange, call CalMAX at (916) 255-2369.

California Waste Exchange

The California Waste Exchange (CWE) is a free program administered by the Department of Toxic Substances Control. The program serves businesses which generate hazardous waste and offers two types of assistance:

(1) direct assistance
(2) publication of the *Directory of Industrial Recyclers and Listing of Hazardous Wastes Available for Recycling*

Direct Assistance:

CWE staff may assist companies by clarifying the applicability of recycling exemptions to a specific process or exchange, discussing other regulatory issues, or referring them to appropriate technical resources. (Consult with the Santa Clara County Hazardous Materials Compliance Division (HMCD) prior to calling CWE.)

Directory of Industrial Recyclers & Listing of Hazardous Wastes Available for Recycling:

CWE publishes the *Directory of Industrial Recyclers and Listing of Hazardous Wastes Available for Recycling* to increase industry's awareness of available commercial recycling opportunities. The directory lists hazardous waste management firms authorized to receive and recycle specific hazardous wastes. It also lists recyclable hazardous wastes and surplus materials that are available. (See detail below on "wastes eligible for exchange" and "surplus materials.") Listings are categorized by the type of waste managed. Companies which accept "surplus materials" are also listed. (See below for description of "surplus materials.")

To request copies ➡

To request a copy of the *Directory*, call (916) 322-3670 and provide your mailing address.

If interested in a listed item ➡

If interested in an item available, call CWE at the Resource Recovery Unit at (916) 322-4742 and provide them with the listed item's identification code, the issue of the *Directory*, and your company contact, title, and phone number.

To list an item ➡

To list an item, complete and return the application form provided in the *Directory*. CWE will maintain the confidentiality of the lister and will notify them of all interested parties. The lister and responding company are then responsible for subsequent contacts and meeting applicable recycling regulations.

Private Exchanges

Wastes may also be exchanged privately (without using CWE or another formal exchange program), as long as the applicable hazardous waste control laws are met. Check with HMCD (408/299-6930) to verify applicability of recycling exemptions to a proposed exchange.

Wastes Eligible for Exchange:

Hazardous wastes which are recycled by certain methods are excluded from classification as hazardous wastes and can be exchanged, transported and recycled by companies without special authorization (i.e. hazardous waste facility permit, registered hauler, and manifest are not required). However, they still must be handled as hazardous materials, and must comply with applicable conditions of the Hazardous Waste Control Law regarding handling, documentation, and other requirements (H&S; Ch. 6.5; Div. 20; Sect. 25143.2, 25143.9, 25143.10). (Note: These laws are subject to change through the legislative process.)

For example, hazardous wastes ("recyclable materials") which are reused as ingredients in an industrial process to make a product, or as safe and effective substitutes for commercial products, may qualify for exchange under this exclusion if they do not require treatment prior to reuse. There are some exceptions to the exclusion, however, and more generous recycling exemptions may apply to wastes which are recycled at the generator's site or which are non-RCRA wastes. For full details, consult the law, the Santa Clara County Hazardous Materials Compliance Division (HMCD), and/or CWE.

Excerpts from California's Hazardous Waste Recycling Laws ➡ is available from HMCD.

Surplus Materials:

In order to be a "surplus material" (as defined in CCR Sect. 66201.10), the material must be *unused* and transferred to another person for use in a manner for which the material is commonly used. Firms do not require special authorization to accept surplus materials, nor do the materials need to be managed as hazardous wastes (e.g. registered hauler, and manifest are not required for transfer). However, they still must be handled as hazardous materials.

Finding it in the Yellow Pages®...

Case Study: Pest Control

Two years ago, J.H. Steffenson Termite & Pest Control, a Campbell firm, began using a nonchemical alternative to fumigation – thermal eradication. The new heat treatment process, which has been 97% effective at eradicating cockroaches, termites, and carpenter ants, is being licensed to exterminators nation-wide by Isothermics Inc. in southern California.

Thermal eradication treats only the infested area(s) of a building. These areas are wrapped in tarps and "cooked" with hot air (heated to 150°F) for 3 to 11 hours using propane-powered heaters. The heat does not damage structures, but can affect thermally sensitive items (e.g. CDs, candles, plants) which should be placed in the refrigerator or outdoors.

Compared to fumigation, heat treatment has several distinct advantages:

- *It eliminates the use of toxic chemicals and potential exposure of workers and customers. This is particularly important for people sensitive to methyl bromide, sulfuryl fluoride, or chloropicrin, the chemicals typically used during fumigation which can affect the human central nervous system. (During fumigation, an average 2,000 sq. ft. home is sprayed with 50 to 100 lbs. of methyl bromide and 25 to 500 lbs. of sulfuryl fluoride.)*
- *It's usually cheaper because the cost of expensive chemicals and special permits are avoided.*
- *It's more convenient for the customer. While residents must evacuate their home for at least 4 days after fumigation, they can remain in non-treated areas of a home during heat treatment (the temperature approximates a sauna).*

These benefits are great marketing points in today's environmental and convenience-oriented marketplace!

For more information call
Santa Clara County Pollution Prevention Program
408-441-1195

It is not always obvious what heading to look under in the Yellow Pages® for the services or products you need. In order to help you, some typical types of services and equipment commonly needed by companies which use hazardous materials and/or generate hazardous waste are summarized below. After each summary is a list of appropriate headings to look under in either

- your local **Yellow Pages®**, or
- the **Northern California Business to Business** directory

for companies which provide such services and/or equipment.

Environmental Engineers & Consultants

Environmental engineers and consultants assist with site remediation (hazardous material/waste cleanup), hazardous waste management operations, and waste reduction-oriented process modifications. These services include:

- **Analysis:** Site investigation and in-house laboratory work
- **Cleanup:** Initial site investigation and contamination removal
- **Compliance:** Waste stream audits, assistance with permitting procedures and forms, personnel training
- **Engineering:** Process modifications, installation of pollution control equipment, and scientific research

To find environmental engineers and consultants, look under:

ENGINEERS-CHEMICAL
ENGINEERS-CONSULTING
ENVIRONMENTAL AND ECOLOGICAL SERVICES
HAZARDOUS CHEMICAL CONSULTANTS

Worker Health & Safety Consultants

Worker health and safety consultants offer assistance in improving the health and safety conditions of workers, and meeting related regulatory requirements. Consultants offer testing, inspection, analysis, and employee training in areas such as hazard identification and management (asbestos, chemical and physical hazards, etc.); safety procedures and equipment use; emergency preparedness and response; first aid; disaster plans; and indoor air quality.

To find worker health and safety consultants, look under:

FIRE PROTECTION CONSULTANTS
HAZARDOUS CHEMICAL CONSULTANTS
INDUSTRIAL HYGIENE CONSULTANTS
SAFETY CONSULTANTS

Analytical Laboratories

Analytical labs offer a variety of services involving chemical and bacteriological testing and analysis, including (1) hazardous waste analysis, (2) groundwater and soil testing, (3) wastewater effluent analysis, and (4) process fluids analysis.

Analytical Laboratories, cont.

To verify certification of a particular firm or to get a list of all certified labs in the state, call DTSC at (510) 540-2800. ➡

Hazardous waste generators often need to use labs to "profile" their hazardous wastes prior to contracting with a commercial waste management facility, or in order to verify that a particular industrial waste is not hazardous. Use only State-certified labs for hazardous waste profiling or for an analysis which will be used for any kind of regulatory purpose.

To find analytical laboratories, look under:

LABORATORIES - ANALYTICAL
LABORATORIES - TESTING

Labels & Signs

Companies which supply hazardous waste labels and chemical hazard signs required by regulatory agencies (OSHA, EPA, and DOT, etc.) include:

California Safety & Supply Co. *(408) 727-8530, 306 Matthew, Santa Clara*

HCL *(408) 738-4161, 3060 Raymond, Santa Clara*

K-Fire Equipment *(408) 733-9379 989 E. California Ave., Ste. 10, Sunnyvale*

Label Master *(800) 621-5808 Chicago*

Safety Equipment & Supplies

Hazardous materials and waste management requires the use of various safety equipment to protect worker health and environment. Examples include temporary and permanent berms and other containment/spill control devices, protective clothing and eyewear, respiratory protection, first aid supplies, fire suppression equipment, gas detectors, alarms, safety signs and markers, and hazardous waste labels.

To find hazardous waste management safety equipment vendors, look under:

FIRE PROTECTION EQUIPMENT AND SUPPLIES
INDUSTRIAL EQUIPMENT AND SUPPLIES
SAFETY EQUIPMENT

Hazardous Waste Management Service & Equipment Providers

Hazardous waste management services include hazardous waste transporters and facilities which treat, recycle, reclaim, incinerate, or otherwise "dispose" of hazardous wastes generated by other companies. Some companies provide comprehensive "route hauler" or "milk-run" services (e.g. pick up waste and replace with fresh materials) for specific industries.

You can also purchase equipment to recycle and/or treat wastes yourself (treatment requires a permit from DTSC). Be sure to use a reputable company.

To find hazardous waste transporters and management services, look under:

OILS - WASTE
WASTE DISPOSAL - HAZARDOUS
WASTE REDUCTION, DISPOSAL AND RECYCLING SERVICE - INDUSTRIAL

To find industrial laundry services for oil- and solvent-stained rags and uniforms (they should *not* be soaked), look under:

LAUNDRIES
UNIFORM RENTING AND CLEANING SERVICES

To find hazardous waste recycling and treatment equipment vendors, look under:

INDUSTRIAL EQUIPMENT AND SUPPLIES
WASTE DISPOSAL EQUIPMENT - INDUSTRIAL
WATER POLLUTION CONTROL

Read Appendix F for tips on choosing responsible hazardous waste transporters and management facilities, including verifying proper state and federal authorization, registration, etc. (e.g. transporters must be registered with the State to haul hazardous wastes.)

Also see the Vendor Directory included in this guide for a partial listing of hazardous waste management service and equipment providers. ➡

APPENDIX F

Choosing Reliable Services

Selecting competent and reliable hazardous waste transporters and management facilities is extremely important. As a generator, you have "cradle-to-grave" responsibility for the hazardous waste you produce. No amount of contract language can insulate a generator from potential liability if their hazardous wastes eventually cause a problem. Therefore, in order to minimize the potential for future expense, it is in your best interest to choose services which are legally authorized, have high safety standards, and show a good track record. Although cost is certainly a major factor, quality of service should be your primary concern.

Before selecting a transporter or treatment, storage, or disposal facility (TSDF), obtain information about their services. Be sure they meet your needs, particularly in the area of environmental compliance assistance and wastestream capabilities. Then do a little background check into their regulatory status, safety record, and customer satisfaction.

These criteria and others are outlined in more detail below to provide some guidance for comparing alternative services. (Note: TSDFs that are also transporters, and transporters that also operate a storage facility, should be evaluated for both criteria.)

CRITERIA	HAZARDOUS WASTE TRANSPORTERS	WASTE MANAGEMENT FACILITIES
Required Permits, etc.	Hazardous waste transporters should have: (1) An EPA/state identification number; (2) Hazardous waste transporter registration with the State Department of Toxic Substance Control (DTSC) (ask for a copy or call DTSC at (916) 324-2430 to verify *current* registration); (3) Hazardous materials transporter registration with the U.S. Department of Transportation (DOT); (4) A hazardous materials/waste endorsement from the Department of Motor Vehicles (DMV); (5) Registration in the destination state for interstate transport (if applicable).	Treatment, storage, or disposal facilities (TSDFs) should have: (1) An EPA/state identification number; (2) Authorization to treat hazardous waste (e.g. a RCRA permit, an interim status document (ISD), or a variance for non-RCRA waste management); and (3) Applicable local, regional, and state permits (e.g. HazMat permit, industrial waste discharge permit, air quality district permit, etc.)
Safety, Training, & Equipment	You will want to make sure that the facilities or transporters you choose operate under strict safety and training standards to minimize the potential for accidents or spills involving your waste. Look for services which offer financial indemnification for any costs related to the negligence or misconduct on the part of the service provider, its employees, or contractors. Both transporters and TSDFs should have training programs which address: (1) Facility evacuation (2) Use and inspection of safety and emergency equipment (3) Emergency response procedures and contingency plan follow-through (4) Container labelling and vehicle placarding (5) Regular facility/vehicle maintenance checks Contingency plans should designate equipment and trained personnel for emergency/spill response. Transporters should also have a list of private emergency response contractors which can respond along established transportation routes.	TSDF operation plans should address all aspects of facility operations, including equipment maintenance and provisions for security (e.g. fencing and adequate warning signs).

CRITERIA	HAZARDOUS WASTE TRANSPORTERS	WASTE MANAGEMENT FACILITIES
Safety, Training, & Equipment, cont.	See right for hazardous material/waste handler requirements. Hazardous waste transporter drivers must also be trained in pre-trip safety inspection; vehicle controls, equipment, operation, and handling; compatibility and segregation of cargo in mixed loads; package handling methods; and load securement. Also, check to see if the company has a thorough drug screening policy for its drivers.	All hazardous materials/waste handlers are required to have on-the-job and formal training that includes (1) general training for recognition and identification of hazardous materials, (2) function/job-specific training , and (3) safety training (emergency response and accident/exposure prevention). These training requirements may be met by a one-time 40-hour Hazardous Waste and Operations training course and 8-hour annual refresher courses.
	Training records or copies of employee training certificates can verify fulfillment of training requirements. Training record information is also available in inspection reports (see below).	
Liability Insurance	To minimize your liability, be sure the services you select meet or exceed minimum liability requirements (a copy of the Certificate of Insurance will show the amount of insurance coverage held by the company).	
	Transporters must meet minimum liability requirements for the type and quantity of hazardous waste being transported in order to register with DTSC. A current hazardous waste transporter registration indicates the transporter has met DTSC's insurance requirements. If you need more specific information about liability requirements for transporters, call DTSC at (916) 324-2430.	TSDFs *currently* permitted with DTSC and US EPA are required to maintain liability coverage for sudden and accidental occurrences of at least **$1 million** per occurrence and annual aggregate of at least **$2 million**, exclusive of legal defense costs. TSDFs that contain surface impoundments, landfills, and land treatment units must also have coverage for non-sudden accidental occurrences of at least **$3 million** per occurrence, with an annual aggregate of **$6 million**, exclusive of legal defense costs.
Inspection Records	Many of the criteria described above can be checked using available inspection reports:	
	Hazardous waste transporters are inspected annually by the California Highway Patrol (CHP). The following elements are evaluated: (1) Vehicle maintenance program and records (2) Driving records (including "point counts") and drivers license information (3) Hazardous materials transportation procedures to ensure compliance with DTSC, CHP, and DOT requirements (4) Carrier ID requirements (5) Mechanical condition of vehicles A report describing the findings and transporter's rating of satisfactory or unsatisfactory can be obtained through the MISTER program. The Management Information System of Terminal Evaluation Records (MISTER) maintains two types of records available through the CHP Commercial Records Unit. Ask for the *complete* MISTER, which includes safety ratings, basic information such as emergency contacts, a list of all hazardous waste/materials accidents and spills, and a list of all tickets issued or violations incurred.	TSDFs are inspected annually by DTSC in their compliance evaluation inspection (CEI). The CEI evaluates the following aspects of a facility: (1) Containers (including labelling requirements), tanks, and containment areas; (2) Pipes, valves, and pumps; (3) Emergency equipment such as self-contained breathing apparatus (SCBA) units, fire extinguishers, showers, and eye wash facilities; (4) Emergency lights, gates, and fences; (5) Personal protection equipment; and (6) Operation records, including training plans, contingency plans, closure plans, inspection plans, biennial reports, and compliance with financial and land disposal restriction (LDR) requirements. To obtain general site information and violation history on a TSDF, call DTSC at (510) 540-3954 and ask the duty officer for the inspector of that facility. Ask the inspector about the TSDF's operating record and current regulatory status, when the last inspection was conducted, whether the facility is

CRITERIA	HAZARDOUS WASTE TRANSPORTERS	WASTE MANAGEMENT FACILITIES
Inspection Records, cont.	To order, call the CHP at (916) 322-7157 for request forms. There is a service charge and you will need to provide the transporter's California carrier number issued by the CHP ("CHP" number).	under any consent orders to correct past deficiencies, whether the facility is a state or federal superfund site or under other cleanup orders, whether the company is working to remedy any violations or contamination, and any other pertinent information. For out-of-state facilities, you will need to contact the regulatory agency in the state in which the facility is located (DTSC should be able to direct you).
References	Transporters and TSDFs should be able to provide you with a list of customers in your geographic area who generate a similar wastestream(s). Call some and ask about the length of service, satisfaction with service, company reliability, safety practices, whether there have been any spills, emergency incidents, or other mishaps, and any other information pertinent to your circumstances.	
Disposal Options	Know where your waste is going, how it is being managed, and the final disposition of any residues, ash, or empty containers. Ask how "off-spec" waste shipments will be handled.	
	Some transporters have direct relationships with various TSDFs and assist in making arrangements for waste disposal. Others act only as "haulers," which requires that the generator make arrangements with the destination facility. In either case, get information on your waste management facility options (see right).	Contact more than one potential TSDF to get an idea of your options. Choose a service which will assist you to select the most cost-effective *and* environmentally sound disposal option. Choose options which minimize potential future liability. Whenever possible, have your hazardous wastes recycled, reclaimed, or treated, in that order of priority.
Compliance Assistance	It is important that your service provider keep up-to-date with hazardous waste transportation/disposal requirements and regulations. Larger firms may have full-time environmental staff, but even small companies can subscribe to publications, attend workshops, or contract for part-time consulting services. Ask companies how they keep abreast of new requirements and choose one which is informed. Some companies provide customers with private consultations, classes on proper labelling and manifesting, and/or newsletters highlighting new developments and regulations. Look for companies that will assist you in sampling, profiling, manifest preparation, and waste sample shipment, as well as provide you with the 24-hour emergency phone number required for your hazardous waste shipments.	
Cost	Ask the sales staff about minimum charges and options for reducing costs which may not be obvious (e.g. pick-up as needed vs. regularly scheduled pick-up).	
	Look for transporters offering "milk run" services, which allow you to share some of the transportation costs with other small quantity generators transporting drums on the same load. Be sure to find out all costs in advance – many companies separate the various fees involved (e.g. fee for number of drums, fee for truck use, fee for driver time, fee for distance traveled, etc.)	TSDFs must have a "profile" identifying a wastestream's characteristics before accepting it. This usually involves sampling and chemical analysis. Most TSDFs provide profiling services, but some may require or allow outside chemical analysis. Profiling fees range widely from being part of the service contract, to $50, to $350 or more in private labs. Shop around for reasonable rates. Disposal fees will vary depending on the type of waste and type of recycling/treatment/disposal. Choose the option which will minimize current *and* future costs.

CRITERIA	HAZARDOUS WASTE TRANSPORTERS	WASTE MANAGEMENT FACILITIES

Site Visit

If possible, make a site visit before contracting for services. Look for:

- A clean and orderly site and well-maintained equipment/vehicles
- Clear hazard signs and safety warnings
- Properly contained and organized hazardous waste storage areas (no large backlog or stockpiling of empty containers, etc.)
- Adequate supervision of operations
- Appropriate employee safety precautions
- Easy access to safety and emergency response equipment and MSDSs
- Control points and spill containment possibilities
- Adequate security provisions (e.g. fences, locks, alarms, warning signs, etc.)
- Organized record-keeping system (how do they track manifests, how often do they inspect the facility, etc.)

Most transporters working with specific TSDFs audit them periodically to ensure minimum standards are met. If you cannot visit the site yourself, you can use one of these transporter services, a consulting service which evaluates TSDFs, customer referrals, and/or inspection reports.

Additional Information

For hazardous *materials* transportation regulatory requirements, call the CHP's Hazardous Materials Section at (916) 327-3310.

For additional hazardous *waste* transportation regulatory requirements or a list of registered transporters in the State, contact the DTSC Transportation Unit at (916) 324-2430 or the DTSC Region 2 office at (510) 540-3508.

Appendix E and the Vendor Directory can assist you in locating hazardous waste management service providers. A larger listing of commercial recyclers servicing California is also provided in the *Directory of Industrial Recyclers and Listing of Hazardous Wastes Available for Recycling* published by the California Waste Exchange of DTSC. Call (916) 322-3670 to request a free copy.

ACRONYMS & GLOSSARY

AHM . . . . . Acutely Hazardous Materials
ARB . . . . . Air Resources Board (state)
BAAQMD. Bay Area Air Quality Management District
Cal/EPA. . . California Environmental Protection Agency
CalMAX . . California Materials Exchange
Cal/OSHA. California Occupational Safety & Health Administration
CCR . . . . . California Code of Regulations
CEPRC. . . . California Emergency Planning & Response Commission
CERCLA. . . Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund)
CFR. . . . . Code of Federal Regulations
CHP . . . . . California Highway Patrol
CWE . . . . . California Waste Exchange
DOSH. . . . Division of Occupational Safety & Health
DOT . . . . . Department of Transportation (federal)
DTSC. . . . . Department of Toxic Substances Control (state)
EPA . . . . . Environmental Protection Agency (federal)
H&S . . . . . Health and Safety Code (state)
HMBP/HMMP. . . Hazardous Materials Business/Management Plan
HMCD . . . . Hazardous Materials Compliance Division (county)
HSWA. . . . Hazardous and Solid Waste Amendments (to RCRA)
HVLP. . . . . High-Volume Low Pressure
LEPC . . . . . Local Emergency Planning Commission
MOU. . . . . Memorandum of Understanding
MSDS. . . . . Material Safety Data Sheet
NOI . . . . . Notice of Intent
NPDES. . . . National Pollutant Discharge Elimination System
NPS . . . . . Nonpoint Source
OES . . . . . Office of Emergency Services
PBR . . . . . Permit-By-Rule
POTW . . . . Publicly-Owned Treatment Works
RCRA. . . . . Resource Conservation and Recovery Act
RMPP. . . . . Risk Management & Prevention Program
RWQCB. . . Regional Water Quality Control Board
SARA. . . . . Superfund Amendments and Reauthorization Act
SB 14 . . . . . (Senate Bill 14) - Hazardous Waste Source Reduction and Management Review Act
SCVWD. . . Santa Clara Valley Water District
SIC. . . . . Standard Industrial Classification
SQG . . . . . Small Quantity Generator
TRI . . . . . Toxic Release Inventory
TSDF . . . . . Treatment, Storage, and Disposal Facility
UST . . . . . Underground Storage Tank
VOC . . . . . Volatile Organic Compound
VSQG . . . . Very Small Quantity Generator
WRCB. . . . . Water Resources Control Board (state)

Acidic	Having a pH of 5 or less. Highly acidic solutions have a pH of 2 or less and are corrosive.
Aliphatic	Belonging to a class of "fatty" open-chained carbon compounds which do not contain aromatic rings.
Alkaline	Having a pH of 9 or more. Highly alkaline solutions have a pH of 12.5 or more and are corrosive.
Alternative Technology	Technology developed or used to reduce hazardous waste generation, promote recycling, or develop alternative disposal methods.
Aromatic	Belonging to a class of carbon compounds derived from benzene or containing one or more benzene rings such as benzene, phenol, stryrene, toluene, and xylene.
Batch Process	Process in which no new material is fed into or removed from reactor vessel.
Biodegradable	Capable of being decomposed by biological means (e.g. metabolic processing by microorganisms).
Carcinogen	A substance which can cause cancer.
Catalyst	A substance, usually present in small amounts, that increases the rate of a chemical reaction without being consumed in the process.
Chelating Agent	Organic compound which binds with metals in solution and inhibits precipitation.
Chlorinated	Refers to substances, especially solvents, which contain chlorine.
Combustible	Able to ignite at 100°F or above.
Continuous Process	Process in which material is introduced and withdrawn simultaneously in a continuous or on-going manner.
Corrosive	Able to eat away living tissue or other materials by chemical action.
Countercurrent Rinsing	A multi-stage rinse system in which the cleanest (last) rinse is transferred progressively closer to the initial rinse as it becomes contaminated in order to maximize cleaning efficiency while conserving water.
Cradle-to-grave	Refers to the full life-cycle of an object or waste from generation to disposal.
Drag-out	Process or cleaning solution adhering to workpiece after removal from bath. "Drag-in" to subsequent baths contributes impurities.
Effluent	The outflow from a process or treatment unit.
e.g.	Abbreviation for *exempli gratia* (latin) meaning "for example".
Electrocleaning	Parts cleaning method in which hydrogen and oxygen gas bubbles produced during the splitting of water molecules by electricity provide improved cleaning action.
Emissions	Pollutants released to land, air, or surface/groundwater.
Emulsify	To form a suspension of very finely divided oily or resinous liquid in another (watery) liquid.
Extremely Hazardous Waste	A hazardous waste or mixture of wastes which would result in death, disabling personal injury, or serious illness because of its quantity, concentration, or chemical characteristics. Refer to CCR Title 22, Div. 4, Ch. 30, Articles 9 and 11.
Flammable	Able to ignite below 100°F.
Generator	A person or facility which, by nature, ownership, management, or control, is responsible for the generation of hazardous waste.
Good Housekeeping Practices	General operation and maintenance practices which can reduce or eliminate unnecessary spills, leaks, and other material losses. Refer to page 4-1.
Halogenated	Refers to substances, especially solvents, containing chlorine, bromine, fluorine, and/or iodine.
Hazardous Material	Includes but is not limited to a hazardous substance, hazardous waste, or any other material that may pose a significant present or potential hazard to human health or the environment.
Hazardous Waste	Any discarded material that may pose a significant threat to human health or the environment. In California, a waste is considered hazardous if it is ignitable, toxic, reactive, or corrosive as defined in CCR Title 22, Div. 4, Ch. 30, Article 11.

Hazardous Waste Management Hierarchy A prioritization of methods to manage hazardous waste. Management priorities, from the most favorable to least favorable, are source reduction, recycling, treatment, and disposal. Refer to page 1-5, Figure 1.

Hazardous Waste Reduction Assessment An analysis of hazardous waste generating processes to identify opportunities for waste reduction. Also referred to as a waste reduction "audit." See page 3-5.

Hazardous Waste Source Reduction & Management Review Act of 1989 (SB 14) The first piece of legislation in California that requires hazardous waste generators to identify and consider implementing opportunities for source reduction as the preferred method of managing waste. For more information, see page 2-4.

Hazmat Common abbreviation for "hazardous materials."

Heavy Metals Toxic metals such as lead, barium, chromium, cadmium, copper, and mercury.

i.e. Abbreviation for *id est* (latin) meaning "in other words."

Ignitable Able to ignite at less than 140°F and burn easily.

Life-cycle Refers to the full life-span of a product from delivery of raw materials to shipping of final products and waste.

Material Recovery Recovering materials from a process for reuse or recycling.

Material Safety Data Sheet (MSDS) A data sheet which contains the manufacturer's information on the chemical, physical, and toxicological properties of a potentially hazardous product and recommendations for proper handling, storage, disposal, and emergency response.

Milk-run See *Route Hauler*. In addition, usually implies delivery of fresh product to replace used product collected.

Multi-media All environmental media, including land, air, and water. Multi-media pollution prevention refers to preventing pollutant emissions to land, air, and water.

Nonpoint Source Scattered, not-easily identified sources of discharge/contamination.

Non-RCRA Hazardous Waste Hazardous waste which is regulated under state law but not by the federal government under the Resource Conservation and Recovery Act (RCRA).

Offsite Refers to commercial services which treat or recycle another facilities' waste.

Onsite Refers to treatment or recycling done at the facility where the waste is generated.

Organic Belonging to the class of carbon-containing compounds.

Oxidize To degrade a compound through exposure to air (causes electron loss).

Permeability Ability of a material to allow water to pass through.

pH A measure of the acidity or alkalinity of a substance on a scale of 0 to 14 , in which 0 to 6 is acidic, 7 is neutral, and 8 to 14 is alkaline (also called "basic").

Point Source Well-defined, easily identified sources of discharge/contamination.

Pollution Prevention See *Waste Minimization*. Usually emphasizes the multi-media reduction of all wastes.

Pretreatment Onsite process to remove hazardous constituents from industrial wastewaters prior to their release to the sanitary sewer system.

Profile Chemical analysis of a wastestream required by TSDFs prior to acceptance for treatment or disposal.

RCRA Waste Hazardous waste regulated by the federal government under RCRA and defined by lists and characteristics found in Part 261 of 40 CFR.

Reactive Able to catch fire, explode, or give off fumes when exposed to water or air, or displaying extreme chemical activity when combined with other chemicals.

Recovery Methods Treatment methods which also recover material for reuse and recycling. Specific examples are listed at the end of the glossary.

Recycling Reuse or reclamation of waste by: (1) direct reuse as a raw material, (2) processing to eliminate impurities, or (3) recovery of useful components.

Residuals Material remaining after the treatment of a hazardous waste.

Resource Conservation & Recovery Act	"RCRA" is the law that provides for federal regulation of hazardous waste activities from "cradle to grave"(e.g. generation, transportation, treatment, and disposal) to prevent improper disposal and encourage resource conservation.
Resource Recovery	Salvaging discarded materials or converting them into a reusable, saleable, or valuable form.
Reuse	The use of a previously-used material in the same or different process.
Route Hauler	A hazardous waste transporter who picks up hazardous waste typically from small quantity generators (see definition below) with similar wastes along an established route.
Scrubber	A unit which removes undesired substances from a gas by dissolving them in a liquid "scrubbing" agent.
Secondary Containment	A container or other containment (e.g. bermed area) which is capable of holding the hazardous contents of a primary container should it fail.
Skimmer	Device which removes floating contaminants.
Small Quantity Generator (SQG)	A business that generates more than 100 kg (220 pounds) and less than 1,000 kg (2,200 pounds) of hazardous waste per month.
Solvent	A substance used for dissolving another substance.
Source Reduction	A reduction in the volume and/or toxicity of a waste prior to its generation. Includes good "housekeeping" practices, material and product changes, and technological modifications.
Toxic	Able to cause injury, illness, or damage through ingestion, inhalation, or absorption through body surfaces. Acute toxicity results from a single exposure. Chronic toxicity results from recurring exposures over a longer period of time.
Transfer Facility	A facility where hazardous wastes are collected and consolidated for subsequent transportation to a TSDF.
Treatment Methods	Processes which reduce the volume and/or hazardous properties of hazardous wastes prior to disposal. Specific examples are listed at the end of the glossary.
Treatment, Storage, & Disposal Facility	A "TSDF" is a multi-user, commercial, offsite facility for the treatment (includes recycling), storage and/or disposal of hazardous wastes.
Ultrasonic Cleaning	A method of parts cleaning using high frequency sound waves to produce small vacuum bubbles which collapse and cause strong cleaning action on nearby parts (useful for hard-to-reach surfaces).
Uniform Hazardous Waste Manifest	Shipping/waste tracking document which must accompany all shipments of hazardous waste. Must be signed by the generator, transporter, and receiving facility.
Very Small Quantity Generator (VSQG)	A business that generates less than 100 kg (220 lbs) of hazardous waste per month. VSQGs are regulated by the state but not by the federal government.
Volatile	Vaporizing or evaporating quickly.
Volatile Organic Compound (VOC)	Organic compounds which are volatile and react with sunlight to form groundlevel ozone, the main component of smog.
Waste Minimization	The reduction of hazardous waste generated and subsequently treated, stored, or disposed of by means of source reduction and recycling.
Waste Reduction	See *Waste Minimization.* Sometimes includes treatment.
Wastestream Segregation	Separation of wastes in order to prevent reactions among incompatible materials, and to facilitate recycling or treatment and reduce disposal costs.
Wetting Agent	Chemical which reduces the surface tension of water and prevents beading on part surfaces.
Zero Discharge	Not having industrial discharges to the sanitary sewer system or storm drain.

Treatment & Recovery Methods

Activated Sludge: Using sludge to treat dilute solvent waste containing less than 1 percent suspended solids by oxidizing waste in an aeration tank and clarifying the wastewater.

Adsorption: Collecting a liquid on the surface of a solid (usually activated carbon).

Biodegradation: Using aerobic bacteria to decompose organic wastes.

Carbon Adsorption: Decontaminating solvents by collecting them on heated activated carbon, and distilling the solvent vapor.

Carbon treatment: Using bulk or imbedded activated carbon to remove organic contaminants.

Centrifugation: Separating substances by spinning them in a cylinder.

Chemical oxidation: Using oxidants (e.g. potassium permanganate, ozone, hydrogen peroxide) to break down organic wastestreams.

Clarification: Removing solids and floating contaminants and from wastes which have been allowed to settle.

Crystallization: Chilling waste to form crystals which are separated by gravity or filtration.

Dissolved Air Flotation: Separating oil and grease from a mixture using compressed air and rotating skimmer blades (midstream and at the bottom of the mixture) when simple gravity separation is not sufficient.

Distillation: Separating a mixture by heating it to the evaporation point and condensing the resulting vapor, leaving behind the less easily-vaporized components. Common solvent recovery technique.

Electrodialysis: Plating out metal ions by passing the wastestream through membranes positively charged on one side and negatively charged on the other. Used to recover nickel, copper, chromic acid, iron, and zinc.

Electrolytic Recovery: Plating out metal ions by passing the wastestream between positively- and negatively-charged poles (anodes and cathodes). Used to recover copper, tin, silver, zinc, cadmium, and precious metals from plating and etching drag-out.

Electrowinning: See *Electrolytic Recovery.*

Flocculation: Adding a coagulant (congealing compound) during precipitation to produce large easily-removable particles.

Fuel Blending: Blending treatment residuals with other high energy materials to make fuel for industrial furnaces.

Gasification: Incinerating waste (without air or open flame combustion) through vaporization, vapor destruction, and slow condensation of the off-gases as they slowly cool and pass through a secondary heating device.

Incineration: Burning waste using air or open flame combustion to reduce its volume and destroy hazardous components.

Ion Exchange: Passing wastewater through resin beds to absorb metal ions. Used to recover aluminum, arsenic, cadmium, hexavalent and trivalent chromium, cyanide, gold, iron, lead, manganese, nickel, selenium, silver, tin, and zinc.

Membrane Separation: Forcing wastestreams through membranes with micron-sized pores which prevent impurities/contaminants from passing through.

Precipitation: Causing a slightly soluble substance (e.g. metal ion) to become insoluble, as by heat or a chemical reagent (e.g. lime), and separate out from solution.

Pyrolysis: Heating a waste in the absence of oxygen to break it down into smaller chemical units.

Reverse Osmosis: Type of membrane separation in which pores are .0005 to .0025 microns. Used to recover nickel, nickel sulfate, copper pyrophosphate, nickel fluoroborate, zinc chloride, copper cyanide, zinc cyanide, and cadmium cyanide.

Simple Gravity Separation: Separating out differently-weighted components of a wastestream by allowing mixture to settle into layers and extracting them.

Solidification: Adding cementious materials (e.g. cement, lime, pozzolan, fly ash) to a liquid/semi-liquid wastestream to render it solid and limit the solubility of the hazardous constituents.

Solvent Extraction: Separating solvents by adding a solution in which some solvents dissolve while others remain insoluble.

Spray Absorption: Capturing and recovering solvents from the air after solvents pass through spray booths and ovens.

Stabilization: See *Solidification.*

Ultrafiltration: Type of membrane separation in which pores are .0025 to .01 microns.

Other Terms & Definitions:

VENDOR DIRECTORY

This directory is a partial listing of hazardous waste management equipment and service providers. Generally, the vendors listed are those which can help you recycle your wastes. In recognition that not all wastes are easily recyclable, non-recycling opportunities may also be listed.

The current permit status of listed hazardous waste management facilities has not been verified. ***It is the generator's responsibility to determine a facility's reliability and possession of applicable permits, insurance, etc.,*** before sending wastes there for recycling, treatment, or disposal (see Appendix F for guidance).

The inclusion of any firm or product in this directory does not constitute a recommendation or endorsement. The directory is provided as a service only. Other sources of vendor references include the Yellow Pages® (see Appendix E for suggested key terms), your trade association and other members of your industry, and the California Waste Exchange *Directory of Industrial Recyclers and Listing of Hazardous Wastes Available for Recycling* (see page D-2 for more information).

Service Providers V-2

Companies are listed according to the wastes managed:

- Acids/Caustics
- Antifreeze
- Aqueous Wastes
- Batteries
- Coolant (metal working)
- Dry Cleaning Wastes
- Empty Drums
- Metals (mercury)
- Metals (non-precious)
- Metals (precious)
- Miscellaneous
- Oil, etc.
- Paint, etc.
- PCB Wastes
- Solvents
- Surplus Materials
- Tires

Equipment Sellers V-10

Companies are listed according to the waste or process equipment is designed to manage:

- Acids
- Antifreeze
- Metals
- Miscellaneous
- Oil, etc.
- Paint, etc.
- Parts Cleaning
- Plating Processes
- Refrigerant
- Solvents
- Wastewater

ACIDS/CAUSTICS

ETICAM	800/648-9931 2095 Newlands Dr., E Fernley NV 89408	Caustics and waste acids, including hydrochloric, nitric, sulfuric, chromic, and phosphoric. High organic content may result in rejection of the waste.
General Chemical Corporation	510/232-7193 525 Castro Street Richmond CA 94801	Sulfuric acid recycling (80 percent minimum).
Imperial West Chemical Company	510/727-8230 P.O. Box 696 Antioch CA 94509	Sulfuric acid (80 percent minimum), hydrochloric acid.
Rhone-Poulenc Basic Chemicals Co.	713/683-3314 4570 Ardine Street South Gate CA 90280	Sulfuric acid recycling.
Southern California Chemical, Division of CP Chemicals, Inc.	510/489-1478 34400 Zwissig Way Union City CA 94587	Acids and caustics. High organic content may render waste unacceptable.

ANTIFREEZE

Antifreeze Environmental Service Corporation	415/325-2666 2081 Bay Road East Palo Alto CA 94303	Pickup waste antifreeze, used or contaminated ethylene glycol (drums or bulk) and replace with new (recycled) antifreeze. Other automotive wastes, too. See "Miscellaneous."
Environmental Safety Services	209/523-5733 4501 Paradise Road Modesto CA 95351	Antifreeze recycled at generator's site for immediate reuse (100 gallons minimum – smaller amounts accepted with ongoing service).
Mobile Anti-Freeze Recycling	707/996-4406 125 Madrid Way Sonoma CA 95476	Mobile equipment used to recycle waste antifreeze at generator's site for immediate reuse.

AQUEOUS

Safeway Chemical	408/292-9289 597 West Taylor Street, #2 San Jose CA 95110	Cleaning solution maintenance and waste removal/disposal services for water-based parts cleaners including hot tanks, jet sprays, and drain sumps.

BATTERIES

California Battery X-Change	510/827-4033 280 Buchanan Field Rd, #6 Concord CA 94520	Lead-acid: Will pick up small quantities in central areas or large quantities in remote areas.
Donley Battery	408/427-3773. 210 Encinal Street Santa Cruz CA 95060	Lead-acid: Call to find out if pickup available.

Dye's Battery Service	510/687-5700 1300 Galaxy Way Concord CA 94520	Lead-acid: Will pick up small quantities or customer can drop off.
Kinsbursky Brothers, Inc./Alkin Precious Metals, Inc.	714/738-8516 1314 North Lemon Street Anaheim CA 92801	Nickel-cadmium and carbon-zinc batteries. Also accept automotive catalytic converters.
Recovery and Reclamation, Inc.	915/447-3272 PO Box 571 Pecos TX 79772	Household and industrial batteries: alkaline, lithium, mercury, nickel-cadmium, nickel-iron, and carbon-zinc.
San Jose Battery Center (Ace Battery Center)	408/947-1726 670 Stockton Avenue San Jose CA 95126	Lead-acid: Drop off.

COOLANT (metalworking)

Environmental Safety Services	209/523-5733 4501 Paradise Road Modesto CA 95351	Metal working coolants recycled at generator's site for immediate reuse (100 gallons minimum – smaller amounts accepted with ongoing service).
Fluid Recycling Services, Inc.	510/293-0424 2415 Radley Court, Unit 4 Hayward CA 94545	Metal working coolants and machine oils recycled at generator's site for immediate reuse.

DRY CLEANING WASTES

Safety-Kleen Corporation	408/294-8778 1147 North 10th Street San Jose CA 95112	Pickup of dry cleaning wastes (perchloroethylene, filter cartridges, and still bottoms).
Technichem	510/652-5455 4245 Halleck Street Emeryville CA 94608	Pickup of dry cleaning wastes (perchloroethylene, stoddard solvent, filter cartridges, and still bottoms).

EMPTY DRUMS

American Drum	408/272-8272 545 Nipper Avenue San Jose CA 95133	Pickup of steel, polyethylene, and composite containers of all sizes.
Container Management Services (A Division of West Drum Inc.)	510/786-9762 21301 Cloud Way Hayward CA 94545	Recycling/disposal of containers (1 pint to 85 gallons).
Gonzalez Drum Disposal Facility	415/822-3130 1324 Fitzgerald Avenue San Francisco CA 94124	Disposal of empty drums and buckets, sale of reconditioned drums, and over pack drums.

METALS (mercury)

Mercury Technologies International	510/429-1129 30677 Huntwood Avenue Hayward CA 94544	Fluorescent tubes. Call for information on other mercury-containing materials.
Quicksilver Products, Inc.	415/468-2000 200 Valley Drive, Suite 1 Brisbane CA 94005	Any quantity of metallic mercury; mercury-contaminated products (e.g. thermometers, switches, sludges, etc.).

METALS (non-precious)

Alpha Metals, Inc.	310/603-9255 2751 El Presidio Carson CA 90810	Spent solder, dross, and anode butts.
Chem-Tech Systems, Inc.	213/268-5056 3650 East 26th Street Los Angeles CA 90023	Metal-bearing wastes from electroplating shops, printed circuitboard manufacturers, and metal finishing industries.
ECS Refining	408/988-4386 705 Reed Street Santa Clara CA 95050	Solder and solder dross, lead/tin residues. No liquids accepted.
ENCYCLE/Texas, Inc.	800/443-0144 5500 Up River Road Corpus Christi TX 78407	Heavy metal bearing solids/sludges containing copper, nickel, lead, zinc, chromium, tin, and cadmium.
ETICAM	800/648-9931 2095 Newlands Dr., E Fernley NV 89408	Heavy metal bearing liquids or sludges of inorganic acid, caustic, or cyanide waste. Metals such as copper, nickel, lead, zinc, chromium, tin, cadmium, molybdenum tungsten, and cobalt.
Great Western Chemical Co.	408/262-2830 945 Ames Avenue Milpitas CA 95035	Pickup electroplating and printed circuitboard wastes from plating baths and rack stripping for recycling. Process and waste treatment consultations.
Micrometallics Corporation	408/998-4930 1695 Monterey Highway San Jose CA 95112	Copper, metal, or sludge waste; solder or solder dross, lead/tin residues. High chromium or organic content may render the waste unacceptable.
Norris Environmental Services	510/736-8318 or 213/588-7111 5215 S Boyle Avenue Los Angeles CA 90058	Heavy metal bearing liquid or sludges of inorganic acid, caustic, or cyanide waste. Metals such as copper, nickel, chromium, cadmium, lead, zinc, tin, molybdenum and cobalt.
Solvent Services	408/259-9910 660 Lenfest Road San Jose CA 95133	Copper, nickel, and other metal-bearing wastes.

Southern California Chemical, Division of CP Chemicals, Inc.	510/489-1478 34400 Zwissig Way Union City CA 94587	Solutions of copper chloride, nitrate, oxide, and sulfate; ferric chloride, nickel chloride, nickel sulfamate, nickel sulfate, and solder stripper. High organic content may render waste unacceptable.
World Resources Company	602/233-9166 8113 West Sherman Street Phoenix AZ 85043	Metal bearing sludges: copper, nickel, tin, and zinc. F006, F008, F019, D006-D011 wastes accepted. Minimum 20-25% solids. No free liquids.

METALS (precious)

Cooke Resources Company	408/238-6096 P.O. Box 51144 San Jose CA 95151-5144	Pickup of waste photographic chemicals.
Drew Resources Corporation	510/527-7100 1717 4th Street Berkeley CA 94710	Photographic solutions and wastes, including films and papers, emulsion, ash, silver flake, silver residues, and recovery cartridges. Jeweler's waste, electronic circuit waste, and others including gold and silver scrap, powders, sweeps, and wipes.
EcoSolution	408/279-3932 1283 Singletary Avenue San Jose CA 95126	Photographic fixer and rinse waters. Special quarterly dental office program - includes training and compliance assistance.
ETICAM	800/648-9931 2095 Newlands Dr., E Fernley NV 89408	Liquids and filter cakes from electroplating, metal finishing, electronics, photographic, mining, and refining industries; wastes bearing gold, silver, platinum, palladium. Trace organics O.K.
J & B Enterprises	408/988-7900 342 Laurelwood Road Santa Clara CA 95054	Acid and cyanide wastes containing gold, printed circuit boards, scrap electronics components, jewelry scrap, other precious/semiprecious metal-bearing scrap, powder, sweeps, and wipes.
Micrometallics Corporation	408/998-4930 1695 Monterey Highway San Jose CA 95112	Gold, silver, and platinum group metals; scrap electronics components, acid and cyanide solutions, sludges, sweeps, wipes, and residues containing economical amounts of precious metals.
Pacific Sciences Corporation	415/244-9686 20 S Linden Avenue, Unit 2B S. San Francisco CA 94080	Silver-bearing photographic wastes. Full 80% credit for your silver.
PGP Industries, Inc.	213/921-7464 13429 Alondra Boulevard Santa Fe Springs CA 90670	Gold, silver, palladium, platinum, rhodium, osmium, iridium in acid solutions; sludge, ash, sweeps, wipes, residues. Also printed circuit boards, jewelry scrap, photo film, silver cartridges.
Photo Waste Recycling Co., Inc.	415/331-2159 206 Donahue Street Marin City CA 94965	Photographic, X-ray, microfilm, printing, graphic art wastes: fixers, developers, rinses, stabilizers, activators, silver flake, photosensitized film and metallic exchange cartridges. "Milk-run" services.
Romic Chemical Corporation	415/324-1638 2081 Bay Road East Palo Alto CA 94303	Silver waste streams containing acetone and isopropyl alcohol.

MISCELLANEOUS

Antifreeze Environmental Service Corporation	415/325-2666 2081 Bay Road East Palo Alto CA 94303	Pick up and recycling/treatment/disposal of auto repair wastes: oil filters, antifreeze, solvents, oil/fuel-water mixtures, grease, sludge, floor sweep, carb cleaner, etc. (No oil, batteries, tires.) No profiling fee for 14 "standard" profiles.
California Advanced Environmental Technology Corporation (CAETC)	510/782-7000 or 510/233-8001 1125 Hensley Street Richmond CA 94801	Pesticides, fertilizers, household cleaners, paint thinners, paint and solvents, furniture polish, acids and caustics, photographic chemicals, pool chemicals, any flammable, corrosive, poisonous, or toxic product.
Chemical Waste Management	800/843-3604 4227 Technology Drive Fremont CA 94538	Transportation and recycling/treatment/disposal of all wastes except infectious, explosives, and nuclear, to designated facilities. Small quantity generator wastes. Analytical services.
IT International Technology Corporation	408/894-1200 2055 Junction Avenue San Jose CA 95131	Complete chemical packaging, shipping, and disposal services. Includes radioactive, mixed, and hazardous waste.
Laidlaw Environmental Services of California, Inc.	510/372-4800 4501 Pacheco Boulevard Martinez CA 94553	Transportation and recycling/treatment/disposal of all wastes except infectious, radioactive, and nuclear, to designated facilities. Small quantity generator "milk runs." Analytical services.
Morgan Environmental Services	415/355-6566 702 Carmel Avenue Pacifica CA 94044	Transportation and disposal of various wastes including PCB's, mercury, water reactive chemicals. Other services available.
Safety Specialists	408/988-1111 P.O. Box 4420 Santa Clara CA 95054	Pickup and recycling/treatment/disposal of acids, bases, solvents, photographic, and aqueous heavy metal wastes.
Safeway Chemical	408/292-9289 597 West Taylor Street, #2 San Jose CA 95110	Specialize in water-based cleaning equimpment (see "Aqueous Wastes"). Also pick-up and dispose of other wastes, including absorbent, photo/X-ray wastes, solid and liquid ink wastes, contaminated solids, etc.
Van Waters and Rogers, Inc.	408/435-8700 2256 Junction Avenue San Jose CA 95131	Transportation and recycling/treatment/disposal of all wastes except infectious, explosives, and nuclear, to designated facilities. Small quantity generator waste encouraged.

OIL, etc.

Allied Oil and Pumping	408/432-0333 P.O. Box 32128 San Jose CA 95152	Pickup used oil (crankcase drainings, lubricating oils, industrial oils, mixed oils, oily water), oil filters, petroleum tank bottoms, rinsate. (Over 1000/ppm halides transported for incineration.)
Alviso Independent Oil	408/262-2715 1110 Taylor Alviso CA 95002	Pickup used oil (crankcase drainings, lubricating oils, hydraulic fluid) less than 1000/ppm halides and oil filters. (Over 1000/ppm halides transported for incineration.)

Evergreen Environmental Services	510/795-4400 or 800/972-5284 6880 Smith Avenue Newark CA 94560	Used oil (crankcase drainings, lubricating oils, industrial oils, diesels, oily water), oil filters, jet fuels, non-RCRA refinery slops, petroleum tank bottoms, oil based coolants, rinsate, transformer oil (no PCBs). (Re-refine lubricating oils.)
H & H Ship Service	415/543-4835 (24-hour) 220 China Basin San Francisco CA 94107	Waste oil, oil/water mixtures, oil filters, underground tanks, tank bottom waste, fuel waste, aqueous waste with organic petroluem-based residue, bilge water.
Hydradyne, Inc	714/596-7382 2409 First Street Laverne CA 91750	Used oils including hydraulic, synthetic, and lube oil recycled on the generator's site (100 gallon minimum). Oil/water separation.

PAINT, etc.

Environmental Purification Industries (EPI)	310/392-9395 P.O. Box 658 Venice CA 90291	Waste paint, paint-related materials, resins, adhesives, latexes. 1 drum minimum. Wastes with halogens over 1360 ppm or chloride content over 100 ppm unacceptable.
Green Alternatives, Inc.	408/441-0241 1609 A Regatta Lane San Jose CA 95112	Will accept any quantity of uncontaminated water-based/latex paint. Dry O.K. Call first. (Note: Operates under latex recycling exemptions – hazardous waste facility permit not required.)
Pacific Coast Lacquer	408/297-8234 483 Coleman Avenue San Jose CA 95110	Body-shop supply and waste service for lacquer thinners, paint wastes, etc.
Safety-Kleen Corporation	408/294-8778 1147 North 10th Street San Jose CA 95112	Paint wastes and lacquer thinners in drums.

PCB WASTES

Fulcircle Ballast Recyclers NW Regional Office	916/649-9194 8 Tagero Court Sacramento CA 95838	Whole (not dismantled) PCB fluorescent light ballasts.
S.D. Meyers, Inc	510/770-9492 40463 Encyclopedia Circle Fremont CA 94538	Processing of drained or full PCB transformers: cleaned, oil dechlorinated and recycled, Metals and ceramics recycled. No components landfilled. 0 - 600,000+ ppm PCB. No RCRA wastes accepted.
Salesco Systems USA, Inc.	602/233-2955 5736 West Jefferson Phoenix AZ 85043	PCB and non-PCB fluorescent light ballasts.
Unison Transformer Services, Inc.	800/544-0030 1338 Hundred Oaks Drive Charlotte NC 28217	PCB transformers drained and refilled in place or sent to Ohio facility. PCBs are destroyed; metals are recycled.

SOLVENTS

Baron-Blakeslee, Division of Allied-Signal, Inc.	510/794-6511 8333 Enterprise Drive Newark CA 94560	Chlorinated and fluorinated solvents.
Bayday Chemical	408/727-8634 2096-B Walsh Avenue Santa Clara CA 95050	Fluorinated solvents.
California Solvent Recycling Corporation	415/856-7577 P.O. Box 50728 Palo Alto CA 94303	Transportation and recycling/disposal of wastes for small to medium-sized generators. See description below for Romic Chemical for waste types. Also Recycle-Pak™ (lab pack) services for a variety of wastes.
Romic Chemical Corporation	415/324-1638 2081 Bay Road East Palo Alto CA 94303	Aliphatic, aromatic, chlorinated, and fluorinated wastes; alcohols; esters, methylene chloride, TCE, lacquers, paint thinners, Freon, ketones, etc. Low solvent content (IPA, acetone, MEK) water waste streams, sludges, and solids. Larger volumes.
Safety-Kleen Corporation	408/294-8778 1147 North 10th Street San Jose CA 95112	Parts cleaning service: mineral spirits and immersion cleaner.
Solvent Services	408/259-9910 660 Lenfest Road San Jose CA 95133	All halogenated and non-halogenated solvents. Lab packs accepted.

SURPLUS MATERIALS

	Note about permit status:	*A hazardous waste facility permit/authorization is not required to recycle "surplus materials," nor do they need to be managed as hazardous wastes. (See bottom of page D-2 for more information.)*
Alan Baker Company, Inc.	415/589-5515 160 Sylvester Road S. San Francisco CA 94080	Unused electroplating and circuit board chemicals.
Bayview-Hunter's Point Foundation	415/822-1585 5033 Third Street San Francisco CA 94124	Unused paint in limited quantities.
Chem Sources, Inc.	805/257-9390 27833 Hopkins Ave, Ste 1 Valencia CA 91355	On- and off-spec chemicals (dyes, plasticizers, solvents, glycerine, cosmetic ingredients, food additives); virgin and non-virgin perchloroethane and methylene chloride; paint sludge.
Chemicals for Research and Industry, Inc.	510/893-8257 2928 Poplar Street Oakland CA 94608	Unused laboratory and industrial chemicals (small and medium quantities acceptable), glassware, and lab equipment.

Chemstar Urethanes, Inc.	909/735-6522 1148 California Avenue Corona CA 91719	Liquid, slurry, solids of the following: polyols, isocyanates, and MDI/TDI. Minimum one drum; no maximum in bulk quantities.
General Solutions	510/548-1122 3051 Adeline Street, No. 2 Berkeley CA 94703	Unused solvents, agricultural lab and industrial chemicals.
Kemstar Corp.	213/390-0180 3456 Wade Street Los Angeles CA 90066	Unused chemicals, dyes, adhesives, plastics, resins, and related materials.
Martin Metals, Inc.	213/627-7755 1321 Wilson Street Los Angeles CA 90021	Flake caustic (90-99%, no off-spec), borax (10 mole), soda ash, powder charcoal, sulfuric acid (industrial, 66°BE), nitric and hydrochloric acid ferric, and ferrous chloride (technical grade). No contaminated chemicals.
Morgan Environmental Services	415/355-6566 702 Carmel Avenue Pacifica CA 94044	Solvents, adhesives, cements, lab chemicals, Mil-spec materials, catalysts, resins.
Quarternion Chemical	510/535-2311 2026 Livingston Oakland CA 94606	Unused chemicals.
Shape Products	510/534-1186 1127 57th Avenue Oakland CA 94621	Unused chemicals.
TSM Recovery & Recycling Co., Inc.	213/735-9443 3422 West Pico Boulevard Los Angeles CA 90019	Unused photochemicals, photosensitive film/paper, inks, fixer, developer, stabilizer, typesetter chemicals.
U.S. Environmental Services, Inc.	714/891-3108 5312 Production Drive Huntington Bch CA 92649	Unused urethane materials.
Young Performers Theater	415/346-5550 Fort Mason Center, Bldg. C San Francisco CA 94123	Unused paint in limited quantities.

TIRES

Oxford Tire Recycling	800/992-3553 33950 7th Street Union City CA 94587	Any size of tire. Must be whole.

ACIDS

Alameda Instruments	510/462-2900 1075 Serpentine Lane Pleasanton CA 94566	Acid reprocessing and recycling equipment.

ANTIFREEZE

See "WASTEWATER" for radiator flushing.

Active Inc.	602/596-1012 13901 N 73rd Street, Ste 205 Scottsdale AZ 85260	Antifeeze recycling system (fractional distillation).
Finish Thompson	814/455-4478 921 Greengarden Road Erie PA 80304	Bad Ethyl antifreeze recycling system (vacuum distillation).
Fleming Distributing Co.	916/638-7145 P.O. Box 1586 Rancho Cordova CA 95741	BG Cool'r Clean'r Antifreeze Recycling System (filtration and ion exchange).
FPPF Chemical Company	800/553-0509 117 West Tupper Buffalo NY 14201	Antifeeze recycling system (chemically assisted filtration).
RCI Equipment Sales and Leasing	800/266-1990 x20 7373-A Engineer Road San Diego CA 92111	Kleer-Flo antifreeze recycling system (simple and high tech filtration).
Stanadyne Automotive	800/842-2496 92 Deerfield Road Windsor CT 06095	Antifeeze recycling system (reverse osmosis).
The Butler Corp.	800/535-5025 251 Moody Street Ludlow MA 01056	Antifeeze recycling system (simple filtration and centrifugal).
Wynn Oil Company	714/992-2000 1050 W Fifth Street Azusa CA 91702	Wynn's Coolant Service System (chemically assisted filtration).

DRY CLEANING

Houseman Enterprises	510/757-0255 117 South Lake Drive Antioch CA 94509	Dry-to-dry nonvented drycleaning/solvent recovery equipment. Also equipment retrofit and repair.
Laundry & Dry Cleaning Equipment Company	800/698-9188 2121 Evans Avenue San Francisco CA 94124	Dry-to-dry nonvented drycleaning/solvent recovery equipment. Also equipment retrofit and repair.
T & J Equipment & Supplies Inc.	510/732-0247 3464 Diablo Avenue Hayward CA 94545	Dry-to-dry nonvented drycleaning/solvent recovery equipment. Also equipment retrofit and repair. Korean spoken.

METALS

Also see "PLATING PROCESSES" and "WASTEWATER".

Alpha Photo Products	510/893-1436 x1 958 Third Street Oakland CA 94607	Silver recovery system. Various manufacturers represented.
Artvestment Inc./B.T. Industries	408/297-6330 84 W Santa Clara St, Ste 600 San Jose CA 95113	Metal removal filtration material.
Bear Images Photo Graphic	415/321-2327 420 Olive Avenue Palo Alto CA 94306	Silver recovery equipment.
Drew Resources Corporation	510/527-7100 1717 Fourth Street Berkeley CA 94710	Metallic replacement, electrolytic, ion exchange, washwater conservation, photo-sensitized films and papers, x-rays, silver recovery cartridges.
Hallmark Refining Corp.	206/428-5880 1743 Cedardale Road Mt. Vernon WA 98273	On-site metals recovery units.
KINETICO Engineered Sytems, Inc.	415/454-3366 P.O. Box 2056 San Anselmo CA 94979	Metal recovery compliance system: DI water, electrowinning, membrane technology, reverse osmosis.
Picker International	800/635-XRAY 41458 Christy Street Fremont CA 94538	Electrolytic recirculating silver recovery, wash water conservation, and fixer reduction systems for medical imaging. Consultative services.
US Filters	412/772-0044 181 Thorn Hill Road Warrendale PA 15086-7527	Ultrafiltration systems, electrolytic metal recovery cell, electrodialysis systems.

MISCELLANEOUS

Hazcon	510/487-4998 39120 Argonaut Way, #405 Fremont CA 94538	Secondary containment products, filters, fuel pumps, aboveground tanks, alarms and controls, and filter crushers.
Rad-Clean Chemical	415/589-8516 P.O. Box 20656 Castro Valley CA 94546	Filter press/filter dryer, storage tanks, chemicals for treatment of waste water.

OIL, etc.

Airboy Sales & Manufacturing Co.	800/221-8333 P.O. Box 2649 Santa Rosa CA 95405	Filter crushers and new waste oil tanks.
California Waste Containment	510/657-0175 P.O. Box 14738 Fremont CA 94539	Oil Filter Crusher: Oberg Oil Filter Press.

Harvard Filtration Systems	412/225-3650 P.O. Box 276, R.D. 4 Eighty-Four PA 15330	On-site waste hydraulic oil recycling systems.
Hazcon	510/487-4998 39120 Argonaut Way, #405 Fremont CA 94538	Filter crushers.
Refinery Equipment Co.	510/944-5900 1840 San Miguel Drive #203 Walnut Creek CA 94596	Highland Tank Oil/Water Separator (separates oil and greasy solids from wastewater); above- and below-ground units available.
Sanborn Environmental Systems	800/343-3381 25 Commercial Drive Wrentham MA 02093	Ultrafiltration systems for oily wastewater. Portable unit for small to medium-sized shops.
Space Age Solutions	415/467-5100 or 800/428-3645 23 San Bruno Avenue Brisbane CA 94005	Oil skimmers.
Westester Company	619/723-9115 1858 Mary Mac Place Fallbrook CA 92028	Hapco oil-water separator.
Wilden Pump & Eng. Co.	714/783-0621 22069 Van Buren Street Colton CA 92324	Oil Skimmers.

PAINT, etc.

Space Age Solutions	415/467-5100 or 800/428-3645 23 San Bruno Avenue Brisbane CA 94005	Paint booth filter system.
Stripping Technologies, Inc.	602/741-0501 2725 East Ginter Rd. Tucson AZ 85706	Dry stripping system (Plastic Media Blasting).

PARTS CLEANING

Am/Pro Machinery, Inc.	614/873-4651 134 Church Street Plain City Ohio 43064	Am/Pro Thermal Cleaning System ("Bake-off oven").
Bayco Distributors	916/924-8061 4350 Pell Drive Sacramento CA 95838	"Bake-off" ovens.
Hotsy Bay Area	408/998-3051 990 Lonus Street San Jose CA 95112	Pressure and steam cleaning systems. Hot tanks. Lease, sale, and repair.
Multiple Marketing Inc.	510/934-6442 609 Ridgeview Drive Pleasant Hill CA 94523	Dowmar Wastebuster System (non-toxic degreasing and recovery system).

Safety-Kleen Corporation	408/294-8778 1147 North 10th Street San Jose CA 95112	Lease part and paint gun cleaners.
Safeway Chemical	408/292-9289 597 West Taylor Street, #2 San Jose CA 95110	Sales and service of water-based cleaning equipment.
Space Age Solutions	415/467-5100 or 800/428-3645 23 San Bruno Avenue Brisbane CA 94005	Closed-loop jet spray/filter system.
The Mirachem Corporation	602/966-3030 2113 East Fifth Street Tempe AZ 85281-3034	Mirachem 100 and Mirachem 500 (cleaner/degreaser): works on metal, rubber, ceramic, vinyl, fabric, carpet, and concrete. Mirachem 250 (rust and scale remover).

PLATING PROCESSES

Also see "METALS" and "WASTEWATER".

DURCO/The Duriron Company, Inc., Filtration Systems Division	716/549-2500 9542 Hardpan Road Angola NY 14006	Plating bath filtration system.
Noah Precision, Inc.	408/281-7772 2778 Aillo Drive San Jose CA 95111	Etch bath filters.
Poly Products Corporation	714/538-0701 P.O. Box 151 Atwood CA 92601	Process recovery equipment: Evaporative tanks for electroplating process chemical recovery and waste minimization. Counterflow rinsing system.
Remco Engineering	805/640-0086 406-Q Bryant Circle, Box 910 Ojai CA 93023-0910	Plating and wastewater treatment systems: Rinse water controls, metals recovery, ion exchange, reverse osmosis, electrowinning.
SERFILCO, Ltd.	800/323-5431 1777 Shermer Road Northbrook IL 60062-5360	Bath filters, rinse tank conductivity controller, oil-free air agitators, regenerative blowers.

REFRIGERANT

Applied Ecological Systems Retriever	805/481-8161 540 Ocean View Grover City CA 93433	Retriever recovers refrigerant from disabled units as both a gas and a liquid also evacuates disabled units.
Bear Automotive	800/551-1033 2973 Whipple Road Union City CA 94587	Bear Refrigerant Recovery/Recycling System.
Multiple Marketing Inc.	510/934-6442 609 Ridgeview Drive Pleasant Hill CA 94523	Dowmar refrigent recovery and recycling system.

RCI Equipment Sales and Leasing	800/266-1990 x20 7373-A Engineer Road San Diego CA 92111	Robinair Refrigerant Recovery/Recycling Station (lease to own).
Wynn Oil Company	714/992-2000 1050 W Fifth Street Azusa CA 91702	Refrigerant Recovery/Recycle System.

SOLVENTS

Inland Technology Inc.	206/922-8932 2612 Pacific Hwy East, Ste C Tacoma WA 98424	Substitutes for TCE, TCA, Freon 113, MEK, methylene chloride, acetone, perc, and Stoddard Solvent.
Multiple Marketing Inc.	510/934-6442 609 Ridgeview Drive Pleasant Hill CA 94523	Dowmar Body Shop (automatic solvent recovery systems).
PSI/HCT	510/934-8221 1600 S Main Plaza, Ste 170 Walnut Creek CA 94596	Solvent and volatile organic compound treatment systems. Provide free equipment/wastestream analysis of facility.
Siva International	415/589-9600 405 Eccles Avenue S. San Francisco CA 94080	Leasing or purchase of solvent recovery systems, varying sizes available.

WASTEWATER

Advanced Bio-Gest	707/459-9451 300 East Hill Road Willits CA 95490-8714	Organic waste conversion and water recovery system.
Beckart Advanced Wastewater Treatment Technology	714/841-0278 7922 Cypress, Ste 3 Huntington Bch CA 92647	Continuous or batch wastewater treatment systems.
Bio-Services	408/379-4187 1590 La Pradera Drive Campbell CA 95008	Water recovery/organic waste conversion.
CALFRAN International Inc.	310/318-1979 P.O. Box 879 Hermosa Beach CA 90254	Closed loop/zero discharge Cold Vaporization™ units for wastewater from numerous applications (e.g. plating, paint spray booths, parts washing).
CSI Chemical Solutions, Inc.	510/426-1816 400 Main Street Pleasanton CA 94566	"Superstill" high efficiency distillation units. Low operating cost, high purity recycled (distilled) water. Equipment and consultation.
EMC Manufacturing	818/575-1644 1433 Lidcombe Avenue South El Monte CA 91733	Wastewater evaporator.
Hotsy Bay Area	408/998-3051 990 Lonus Street San Jose CA 95112	Recycling and wastewater treatment systems.

KINETICO Engineered Sytems, Inc.	415/454-3366 P.O. Box 2056 San Anselmo CA 94979	Metal recovery compliance system: DI water, electrowinning, membrane technology, reverse osmosis.
MEMTEK	408/448-2443 3851 Charter Park Drive San Jose CA 95136	Liquid hazardous waste/wastewater treatment equipment: precipitation/clarification, metal recovery, membrane filtration, ion exchange, reverse osmosis, and closed-loop water reuse.
NSTC	510/483-7394 1950 Burroughs Street San Leandro CA 94577	Small scale pretreatment systems (oil/water separation, clarification, etc.). Equipment and consultation.
Osmonics	612/933-2277 5951 Clearwater Drive Minnetonka MN 65343	Complete ultrapure water systems: reverse osmosis, ultrafiltration, mixed/twin bed DI, ozonation, and pretreatment filtration. Applicable to a large variety of industries.
Rad-Clean Chemical	415/589-8516 P.O. Box 20656 Castro Valley CA 94546	Closed-loop radiator flush recycling system.
Remco Engineering	805/640-0086 406-Q Bryant Circle, Box 910 Ojai CA 93023-0910	Plating and wastewater treatment systems: Rinse water controls, metals recovery, ion exchange, reverse osmosis, electrowinning.
Simon Wastewater Treatment Systems	408/492-1414 276 Martin Avenue Santa Clara CA 95050	Wastewater treatment systems: metals removal, fluoride precipitation, neutralization, carbon adsorption, air stripping, cyanide destruction, oil/water separation, biological reactors.
Tanks Alot	714/778-5155 220 West Santa Ana Avenue Anaheim CA 92805	Recirculating flush booth and cooling system flushing equipment. Wastewater recovery tank. Above ground recirculating car wash or engine steam cleaning systems.
US Filters	412/772-0044 181 Thorn Hill Road Warrendale PA 15086-7527	Ultrafiltration systems, electrolytic metal recovery cell, electrodialysis systems.

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Custom Color Laboratory

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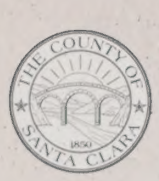
Additional acknowledgments for technical review of "Industry-specific Practices" are listed on page 4-8.



County of Santa Clara
Pollution Prevention Program

Santa Clara Valley
Nonpoint Source
Pollution Control Program